McGRAW-HILL INTERNATIONAL

Management Digest

TECHNICAL • INDUSTRIAL • COMMERCIAL

JANUARY 1956

OVERSEAS EDITION

Civil Aviation Reaches Jet Age as . . .

Plane Makers Rush Jets to World Airlines—p 9

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801E

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Manufactured at the Allis-Chalmers Essendine Works in Great Britain, the new Model D-270 is featured by such modern operating conveniences as instant attachment or release of implements by means of the quick SNAP-COUPLER Hitch, improved wheel spacing adjustments, 4-speed selective gear transmission (2 to 11½ mph), foot brakes, comfortable seat and unobstructed operator visibility.

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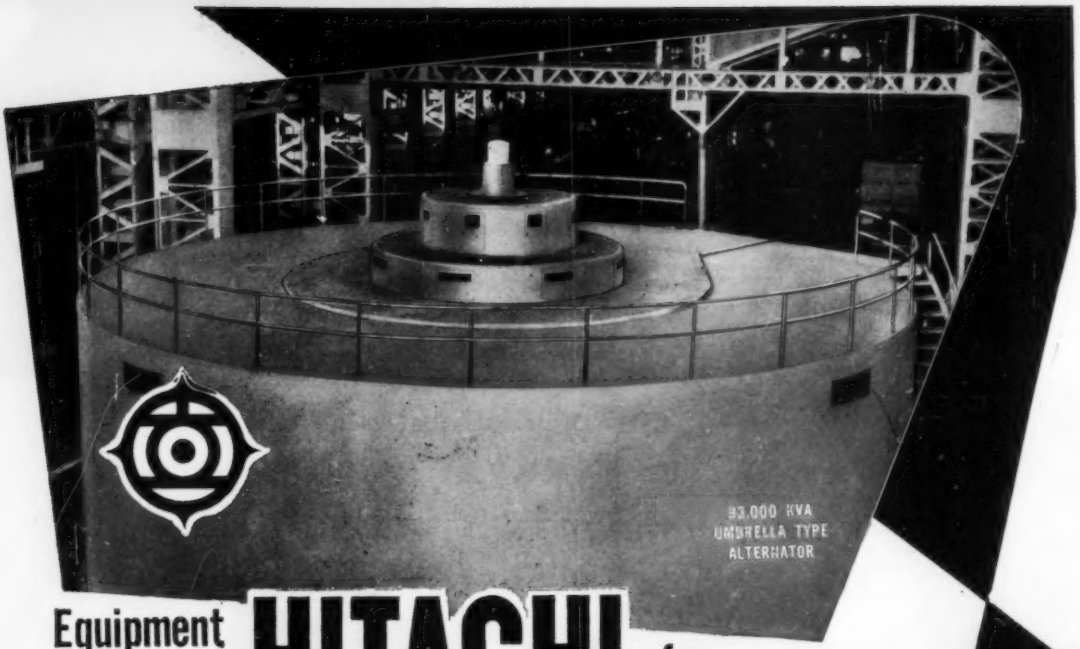

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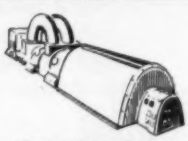
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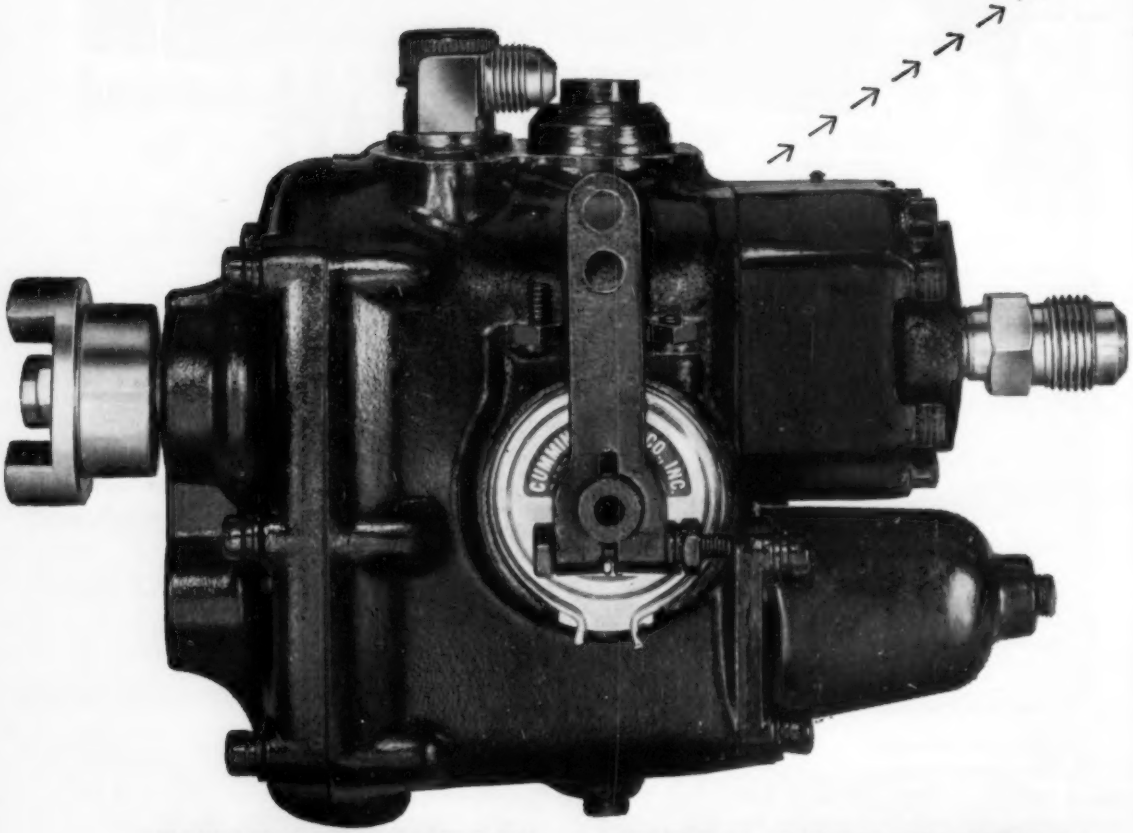
After 260,000 miles....

only $14.34 in parts needed to



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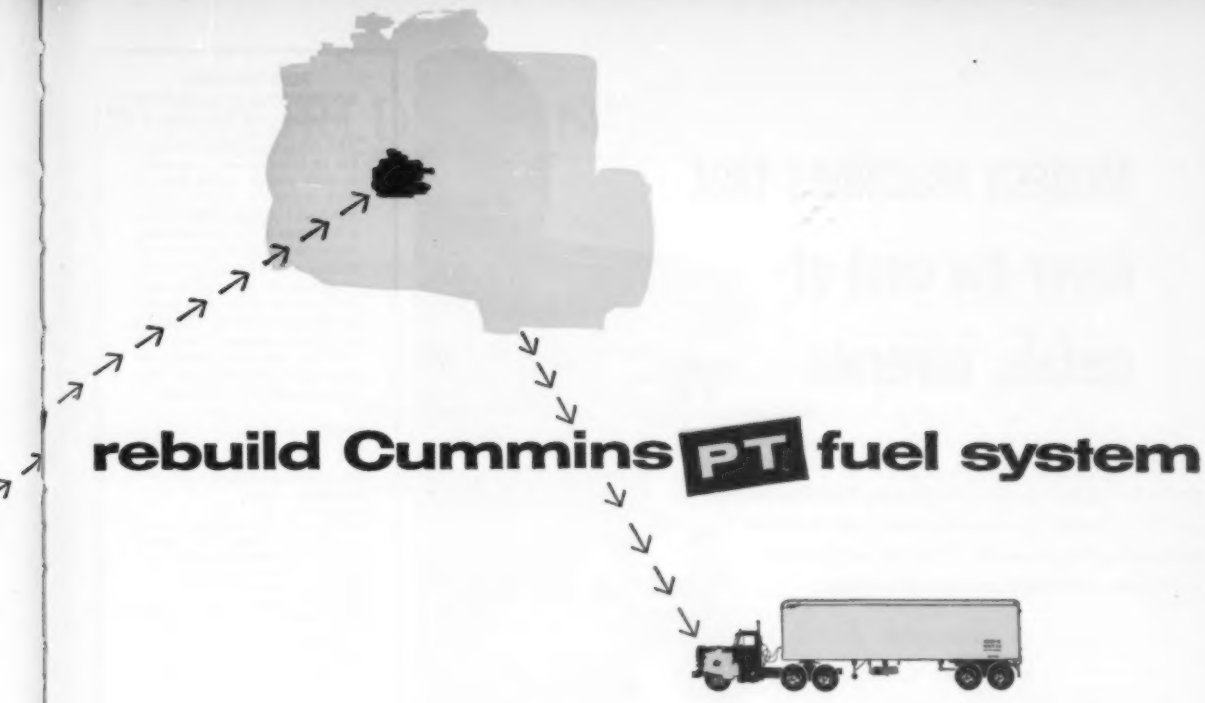
Columbus, Indiana, U.S.A.

New York City Office: 1459 Chrysler Building, East, New York 17, N.Y.



rebuild Cummins PT fuel system

When Transport Lease Co. of Denver, Colorado, overhauled their 300 h.p. Cummins Diesel after 260,000 miles, they also "renewed" their PT fuel system. Here is the record:

	Total Cost	*Cost per 1,000 Miles*
Rebuild PT Fuel Pump—Parts	**$14.34**	$0.055
Check and rebuild PT Pump Labor—4 hours	$16.00	$0.061
Clean, inspect, and re-install injectors Labor—3 hours	$12.00	$0.046
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Total fuel system maintenance cost	$84.34	$0.323

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In addition, with Cummins you get more miles per gallon of fuel, faster speeds on grades, and greater equipment availability. These factors also save you time and money.

Before you make your 1955 plans for purchases of new equipment, learn more about the new PT fuel system . . . from your local Cummins distributor or truck representatives or by mailing us this coupon.

AA-3

Cummins Diesel Export Corporation
Columbus, Indiana

Please send me free illustrated folder, "Cummins PT Fuel System." I would like the following translation:

( ) Spanish ( ) French
( ) Portuguese ( ) English

Name_____

Address_____

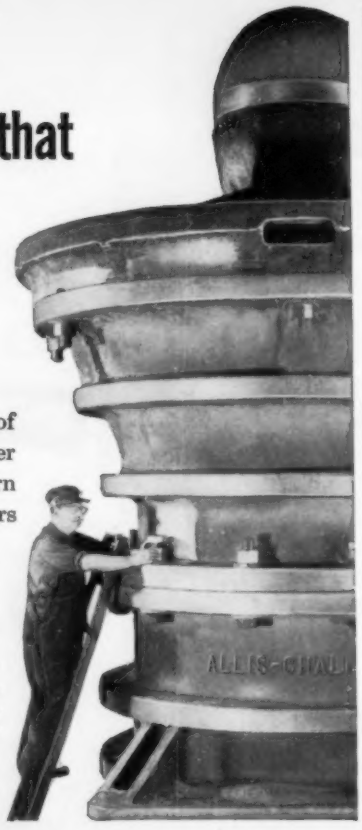
Company_____

City_____ Country_____

MH-b

Modern machines that lower the cost of metals, minerals

Steel, cement, coal and other essentials of good living are better in quality and lower in cost, thanks to the efficiency of modern processing equipment. The Allis-Chalmers machines on this page are examples:



GYRATORY CRUSHER

These crushers break up huge chunks of ore and rock as easily as you might crush peanut shells. Large crushers can process thousands of tons of ore a day.

SOLIDS HANDLING PUMP

These pumps move slurries—mixtures of solids and liquids such as coal and water or sand and water. Some of these pumps are lined with rubber which far outwears metal when handling abrasive material.

VIBRATING SCREEN

Screens are essential equipment for efficient processing of coal, ore and rock products. Screens are used to grade products to uniform sizes and also to remove excess water.

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BRITISH BORNEO—Sandakan.
BURMA—Rangoon.
CANADA—Montreal.
CHILE—Santiago.
COLOMBIA—Barranquilla, Bogotá, Medellín, Cali.
COSTA RICA—San José.
CUBA—Havana.
DOMINICAN REPUBLIC—Ciudad Trujillo.
ECUADOR—Quito.
EL SALVADOR—San Salvador.
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▶ WORLD TRENDS

JAPAN . . .

Businessmen count on a good year in '56. Manufacturing production, which hit a postwar high last year, will increase in the months ahead. Purchasing power is up—and rising. Prices have remained at an even level. Record farm crops last year and a surprisingly high level of exports are the two main reasons for economic health.

A dark cloud, though, is worrying businessmen and traders. Communist nations in the Orient, especially China, are beginning to do a volume of business in the buying markets of Southeast Asia. Light machinery, chemicals, glass, sewing machines, bicycles, cameras are the items that China is starting to export in large quantity.

INDIA . . .

There are "excellent opportunities" for private investment in India. That is the firm opinion of a team of U.S. businessmen who recently toured the country as an official trade mission. They were most impressed by (1) India's reliance on "democratic methods," (2) her fast economic progress, and (3) the Indian Industries Fair in New Delhi. The fair was described as "tremendous."

Indo-U.S. trade is due to expand greatly in the next 2 years, according to trade-mission members. A formal trade treaty is much needed, they say.

WEST GERMANY . . .

Industry is pressing hard for atomic progress. Atom-wise the Germans are 10 years behind Britain, the U.S., and Russia. They plan to catch up by taking full advantage of the research and development done in other countries.

Businessmen will provide the money, facilities, and know-how. Government will provide regulations and control. In return for their full support, businessmen are demanding that burdensome regulations be kept to a minimum. There is little doubt about German industry being well able to finance the atomic program. In the past year the Federal Republic increased its industrial output by about 14%.

UNITED STATES . . .

Growth, not war, is now the basis of U.S. prosperity. New ideas, new products, more men, money and materials, plus great confidence throughout the business community—these are the things upon which the boom is built. And the boom is lasting. It is being guarded by government and treated with sensible caution by businessmen. But it is lasting. It will last through '56. For the story of growth and plans for the future, see p14.

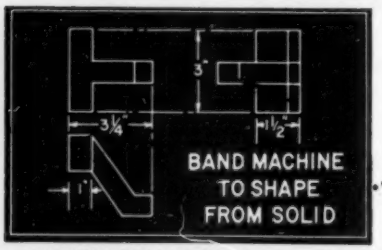
BRAZIL . . .

Outsiders are anxious to invest in Brazil. In fact, interest is higher than any time in years, in spite of political turmoil in Rio. Finance and export people in New York believe that capital outlay can be the answer—the safe answer—to Brazil's dollar shortage.

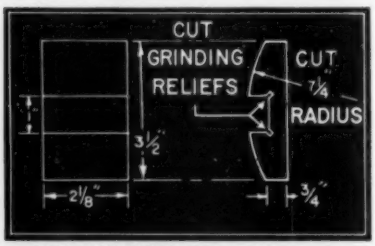
Cut Operating Costs with a DoALL

CONTOUR-MATIC

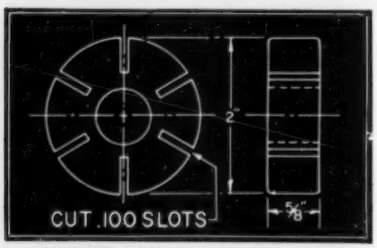
BAND MACHINE...



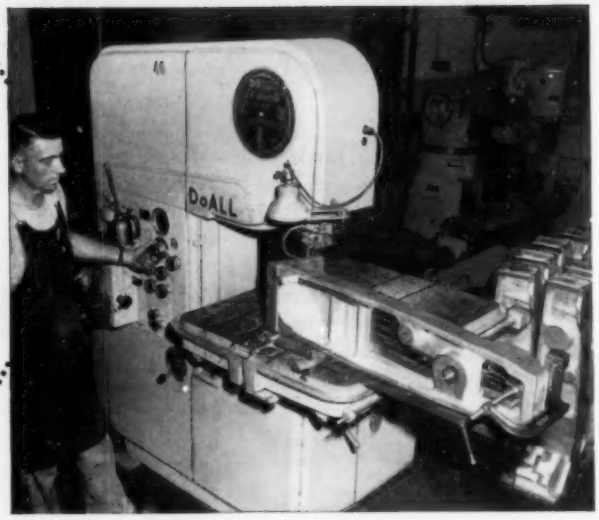
46.28 HOURS SAVED cutting mounting bracket from solid. 75 pieces formerly shaped in 60.00 hours, now band machined in 1.35 hours.



56% TIME SAVING in machining radius and grinding reliefs. 50 pieces formerly milled in 3.10 hours, now band machined in 1.35 hours.



48 HOURS SAVED cutting .100 x .4375 slots in rotors. 2000 formerly milled in 66.6 hours, now band machined in only 18.6 hours—72% less time.



New DoALL Contour-matic band machines have opened up an entirely new machining concept. An automatic hydraulic power feed table carries the work into the thin continuous-cutting band tool. Integral recirculating coolant system and air jet promote high cutting rates and long tool life. Cutting forces hold the work down to the table—only the simplest fixtures are required. Tooling cost is far less than for other machine tools. Setup and machining time is greatly reduced.

Faster cutting . . . lower tooling cost . . . lower capital investment (a DoALL power feed band machine costs but ⅕ to ½ as much as production milling machines, shapers or planers)—These are the money-saving advantages of DoALL *production band machining.*

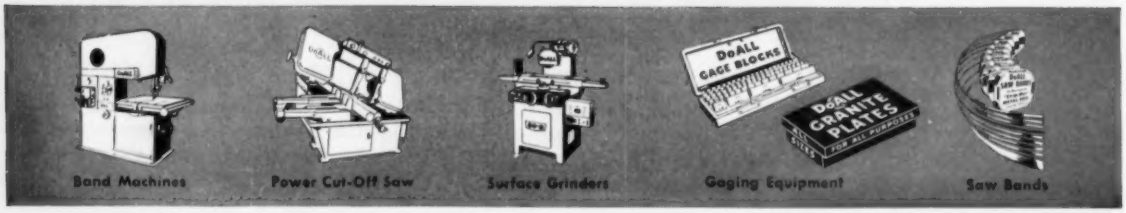
For complete information, write:

THE DoALL COMPANY • Des Plaines, Ill., U.S.A.

Agents in principal cities around the world

DoALL

B-23



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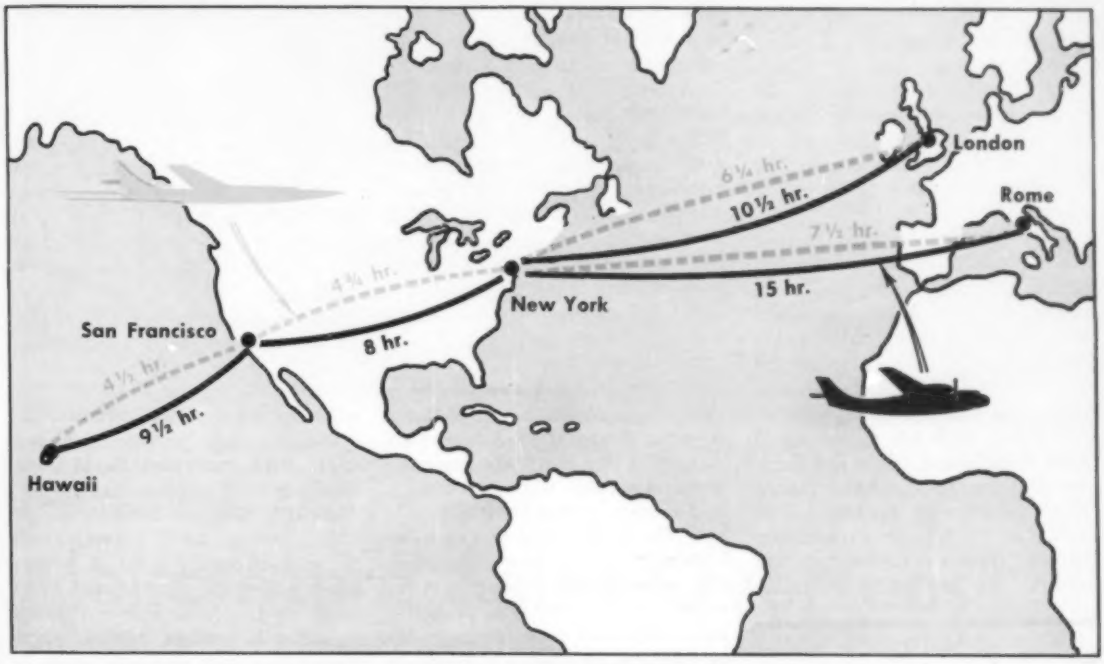


You can start to tear up your old timetables for inter-continental air service as . . .

World Airlines Turn to Jets

Digested from BUSINESS WEEK, Oct 22, p32; THE ECONOMIST (London), Nov 5, p495; AVIATION WEEK, Nov 14, p146

Jet-propelled airplanes are no longer satisfied with setting remarkable speed and distance records. Suddenly—and with the greatest forward thrust they have ever developed—the jets are setting commercial records in the air-transport industry. At least, they are making a fast start toward capturing the world's long-distance commercial skyways.

The big airlines in Europe and America are rushing orders to plane makers. Their spirit seems to be one of urgency. The faster they can get jets into commercial service on a big scale the better—that is the tempo. Here is the evidence:

• United Air Lines (U.S.), with a present fleet of 180 planes, recently announced a $175-million order for 30 long-range jet airliners. The order is the largest jet contract made with a single manufacturer, Douglas Aircraft Co. (U.S.). The planes are designed to haul up to 140 passengers at a speed of 575 miles per hour. Service is planned within the U.S. and for runs between the U.S. and Hawaii. The New York-Los Angeles airtime will be 4½ hours—for an air distance of nearly 2,500 miles.

• American Airlines (U.S.) announced an order for 30 jets that will cost $135-million. Manufacturer is Boeing Airplane Co. (U.S.). American hopes to beat United in a race to provide coast-to-coast service in the U.S. It plans to make the flight in 4¼ hours starting in June 1959.

• Pan American World Airways has ordered 45 giant jet liners—20 from Boeing and 25 from Douglas. Total cost: $269-million. Deliveries will be made from December 1958 until January 1961.

The planes will fly at 550 to 600 miles per hour. On planes now in use, it takes 11 hours from New York to Paris (3,750 miles) and 10½ hours to London. It takes 9½ hours from San Francisco to Hawaii (2,420 miles). With the jets, the New York-Paris run will take 6½ hours, the New York-London run, 6¼ hours; and San Francisco-Hawaii, 4½ hours.

Pan American also possesses an option on three deHavilland Comet jet liners (British). This plane is smaller and has a shorter range than either the Boeing or Douglas models.

• KLM Royal Dutch Airlines has announced an order for 8 Douglas jet liners. This was the first European order for long-range American jets. Delivery will start in 1960. Cost: $56-million.

• Air France has stated it is "definitely in the market for new

(jet) equipment, though not necessarily U.S.-built." The company has executives visiting Lockheed, Boeing and Douglas plants in the U.S.

• British Overseas Airways Corp. has entered the jet picture with 19 deHavilland Comet jet liners ordered for regular flights. The plane will take 9½ hours from London to New York—slower than either Boeing or Douglas jet flying time.

• Several airlines are buying slower but cheaper turboprop planes (having turbine-driven propellers). British European Airways plans to order 20 Vickers Vanguard airliners, a medium-range plane. Canadian Pacific Airlines has ordered three Bristol Britannias with an option on 5 more. American Airlines and Eastern Airlines (U.S.) have placed "big" orders with Lockheed Aircraft Co. (U.S.) for turboprops. British Overseas Airways has ordered 33 Bristol Britannias, which can fly the Atlantic nonstop.

Turboprops are, in a sense, a halfway step between standard propeller-driven craft and jet-powered craft. With lower initial costs, the turboprop airliner is more economical on short runs or multi-stop routes.

The cost of the jets is up sharply from present-day piston-driven propeller craft. The present-day airliner, transcontinental, costs around $2-million. Per plane, the large Boeing or Douglas liners cost (or will cost, when they are built and delivered) something over $6-million.

But the builders and buyers of jets count on more than offsetting the high initial outlay through economy of operation. A New York to London jet that takes only 6¼ hours non-stop will fly with a single crew rather than a double one. The high speed means more trips per plane, greater utilization. The jets will make three flights for every two by today's propeller craft. The high load factor is important too. The jets will carry 40 to 50% more passengers and freight than planes in use today.

American manufacturers apparently will dominate the "big" jet airliner business. U.S. builders and users have concentrated on long-distance jets rather than on medium-distance turboprop craft. Thus, the long-mileage business will go to American companies; medium-mileage business will go to the British and others.

The British have admitted that their future in jets is apt to be limited. *The Aeroplane*, an outstanding British publication, said recently in an editorial: "It seems that we . . . must admit the loss of the market for the big turbojet (pure jet) transport and make the very most of what we actually have in marketable aircraft."

In the "medium-distance field," the British are strong. They concede nothing here. They have sold 275 Vickers turboprop airliners—more than any other plane of its type in the world.

Besides, say the British, the big American jets are still on paper. And it will be 1960 before they have a chance to prove themselves.

Quote of the Month

SIR WALTER MONCKTON
Minister of Labor,
United Kingdom

"I believe that many of the difficulties confronting us today, when industrial peace and higher productivity are so vital to our existence, stem from an unsatisfactory attitude to work—from frustrations and misrepresentations that have their origin in the impersonality so often inherent in our modern industrial systems."

U.S. Willing to Cut Tariffs—Worldwide

Digested from AMERICAN LETTER, Oct 15

A 53-nation meeting of the General Agreement on Tariffs and Trade (GATT) will open in Geneva on January 18. The range of import items on which the U.S. will be willing to negotiate tariff cuts is unusually broad. The list, nearly 1,000 items long, includes nickel, copper, manganese, tungsten, aluminum, steel products, automobiles, alcoholic beverages, tobacco.

All goods on the list, in terms of trade value, accounted for $1.8-billion in U.S. purchases during 1954. This amounted to 17% of total imported merchandise.

As U.S. law sets a maximum of 15% for any tariff reduction, to be spread equally over 3 years, there will be no drastic cuts. Exports to the U.S. will not jump significantly except where price competition with domestic goods is intense.

You can buy the complete list for 30 cents from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

Separate negotiations, which the U.S. has completed with Peru, Italy, and Turkey, have resulted in limited tariff cuts on certain items. Primarily these cuts affect imports from the U.S., but other manufacturing nations that sell to the three countries—such as Britain—will benefit.

Peruvian concessions affect a large group of products including chemicals, electrical equipment, machinery, and metal products. Italy lowered tariffs on punch-card machines. Turkish tariff cuts will be applied primarily to automobiles and parts, and to photographic equipment and supplies.

Similar U.S. agreements are in the making with Austria, Cuba, Dominican Republic, Finland, France, India, Pakistan, Nicaragua, Honduras, and Sweden.

As of October 1, 1955, for exporters to the U.S., consular certification of invoices was no longer necessary. Paperwork is easier.

FROM OVERSEAS, sales representatives of Timken Roller Bearing Co. converged on Canton, Ohio, to have a look at their world headquarters, to meet their management, to learn more about selling roller bearings

Lost Law Fight Forced Timken to . . .

Make More Sales Overseas

Digested from BUSINESS WEEK, Nov 5, p62

Five years ago, Timken Roller Bearing Co., much against its will, started building a world-wide selling organization. The recent visit of 56 overseas sales representatives to its Canton, Ohio, plant, from points as distant as Hong-Kong, Johannesburg, and Teheran, marked the company's success.

In 1951, U.S. courts upheld a government antitrust suit against Timken. They found Timken and its two manufacturing subsidiaries in Britain and France guilty of allocating world manufacturing and selling territories, fixing prices on products sold by any party in another's territory, protecting each other's markets, and participating in foreign cartels restricting U.S. exports.

Timken up to that time had exported only to the Western Hemisphere from Canton. Its British and French subsidiaries divided the rest of the world export market.

But now Timken-U.S.A. had to build up an organization to sell in Europe, Asia, and Africa too. The export manager, H. C. Sauer, knew he had tough competition to face —General Motors, the world-wide SKF bearing companies, and, strangest of all, Timken's own British and French companies. This intra-Timken competition was the strongest too because the British company, with lower labor costs, could undersell Timken-U.S.A. on products they both made.

Gradually the organization was fitted together—from the thousands of applications from potential sales organizations that poured into Timken and from the thousands of miles that Sauer traveled to visit sales outlets.

Then came the actual selling. The first hard problem was to show salesmen how to convert foreign engineers to use of roller bearings from their long-standing preference for ball bearings. Once that could be done, Timken's position as originator of tapered bearings could influence sales.

Perhaps the best single argument for Timken salesmen overseas was, and still is, the fact that its bearings are an important component in U.S. automobiles. This immediately gives a world-wide replacement business.

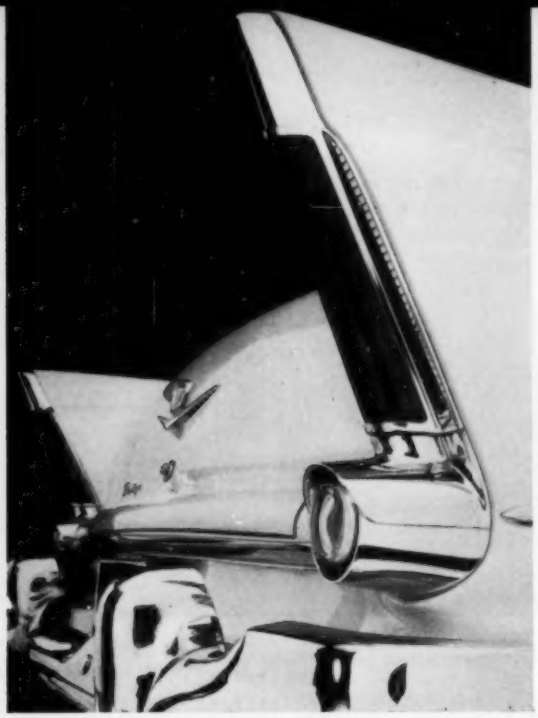
Other sales aids used effectively were the U.S. company's range of production, greater than that of British Timken, and its giving foreign orders immediate delivery whenever possible, something that the European companies could not or would not do.

What have been the results? Timken says its foreign sales are booming. Company officials have not revealed export figures. But industry sources believe that 1955 exports amounted to 5%, or $4-million, of Timken-U.S.A.'s total sales.

Timken entered the world-wide market at a good time. Bearing demand has grown sizably in the last 5 years. European and U.S. exporters last year shared an export market worth about $110-million.

Sweden and the U.S. control about half the total. The U.S. share of about $28-million is split among General Motors, Timken, SKF Industries, Inc., and smaller manufacturers. The rest goes to the British, West Germans, French, Swiss, Italian and Japanese.

With world-wide capacity in balance with demand, competition stays keen. But Timken-U.S.A., with its growing pains behind it, is confident of a bigger share of that market.



DODGE KINGSWAY is recognized by its upswept rear fenders. The feeling is speed and power like that of a jet airplane. Optional V-8 package puts out 230 horsepower.

CONTINENTAL MARK II retains in modern form m styling characteristics of the former Lincoln-Continen

Cos
get

CHRYSLER NEW YORKER has a push-button drive selector. Door latches are designed to hold under impact. Optional equipment includes a high-fidelity record player.

Emphasis for '56

Last year was the year for major changes. But this year's automobile buyer will find more than a "face-lifting" is involved. For one thing, 1956 cars are the most powerful ever built. Automatic transmissions are better. Interiors are luxurious, safety features much in evidence.

Here are some details: All makes offer a V-8 engine. Top power rating is 310 horsepower. But sixes are

NASH introduces two new engines for 1956. V-8 develops 220 horsepower; six-cylinder engine, 130 horsepower. Side color spear permits use of three-tone color combinations.

CHEVROLET shows some grille and sheet-metal change. Four-door hardtops are available in two models. V-8's power is raised. Six-cylinder engine is still optional.

Cost for this prestige car: about $10,000. For this price you get attention to detail unusual in a mass-produced car.

BUICK'S front end is dominated by a wide V-shaped grille. New hood ornament resembles a swept-wing jet bomber.

More Luxury, Power, Safety

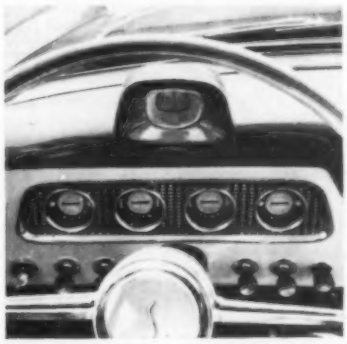
still available. And there's talk of some major engine changes next year (see Your Auto Is Due For Some Changes, elsewhere in this issue). Safety devices include seat belts, shoulder harnesses, special padding, steering wheels that absorb shock, and door latches that stay locked under impact.

A variety of new accessories are available. Among them: a high-fidelity record player, upholstery you can change to suit the occasion, a heater that puts out heat as soon as you turn it on.

Automobile makers are determined to give the car-buying public what it wants. But dealers are worried. Sales show signs of falling off. Manufacturers, however, figure 1956 to be better saleswise than 1955.

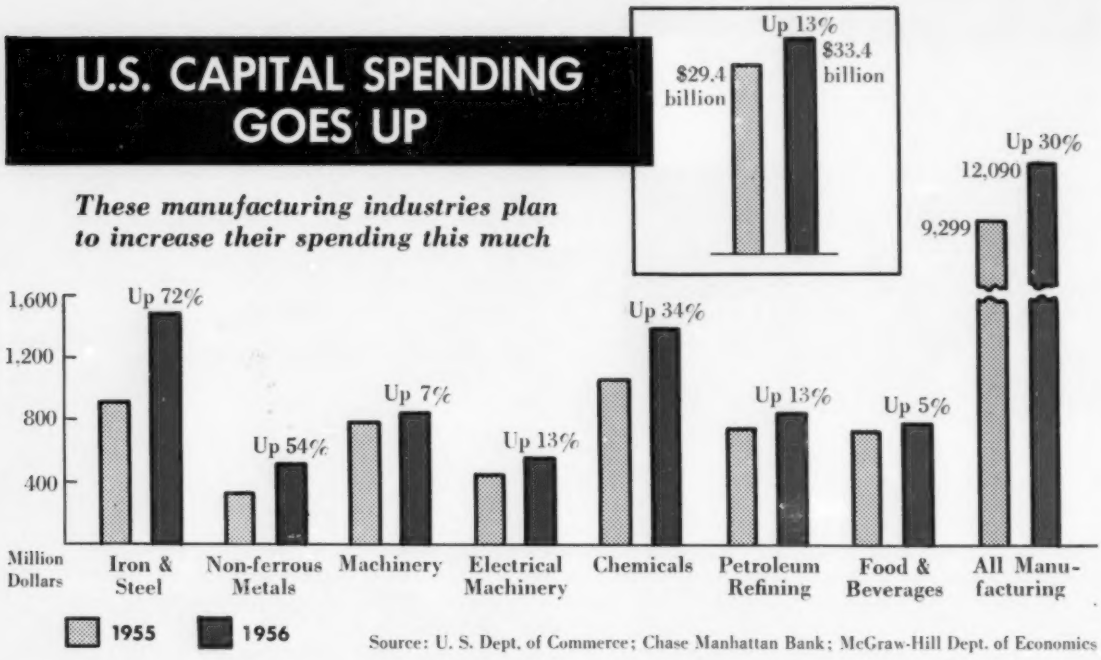
Next month we will survey the new European cars. Both articles show the latest trends in style and equipment.

FORD has gone all-out on safety. Seat belts, collapsible steering wheel, safety latches, padded panel add safety.



STUDEBAKER mounts speedometer on top of panel. Only number showing speed appears and is clearly visible.

PACKARD introduces a push-button console for activating its transmission. Reversible upholstery is optional.



Source: U. S. Dept. of Commerce; Chase Manhattan Bank; McGraw-Hill Dept. of Economics

Sales Outlook: Never Brighter

Digested from a McGRAW-HILL ECONOMICS DEPT. REPORT

American business now plans to spend 13% more for new plants and equipment in 1956 than in 1955. This is the largest increase in planned capital spending since 1951 when plans were boosted to meet the Korean War emergency. Present plans call for total business capital expenditures of $33.4-billion in 1956, compared with $29.4-billion in 1955.

A big slice of this tremendous outlay could fall into your hands. It will need some aggressive selling on your part—competition for the past few years has been fierce and this year will be no exception.

These are the key results of the McGraw-Hill Dept. of Economics survey of company spending plans:

- In every line of manufacturing, spending will go up. The total this year will be above $12-billion —a 30% gain.
- In practically every field, companies expect their sales to go up. In manufacturing industries, the gain expected is 7%.
- The new boom in capital spending may well run into 1957. A large proportion of companies expect to equal or better their 1956 expenditures in the following year.

Not only do the survey results show the biggest year ever in prospect, but they also:

- Provide a definite measure of business confidence. The pause in confidence that came after President Eisenhower's heart attack last September 24 was no more than a pause.
- Suggest rising business all along the line. Capital spending is the great multiplier in the U. S. economy. High activity in the vital heavy goods industries will swell activity—and purchasing power—everywhere.

The biggest gains in capital spending are in primary metals, chemicals, and automobiles.

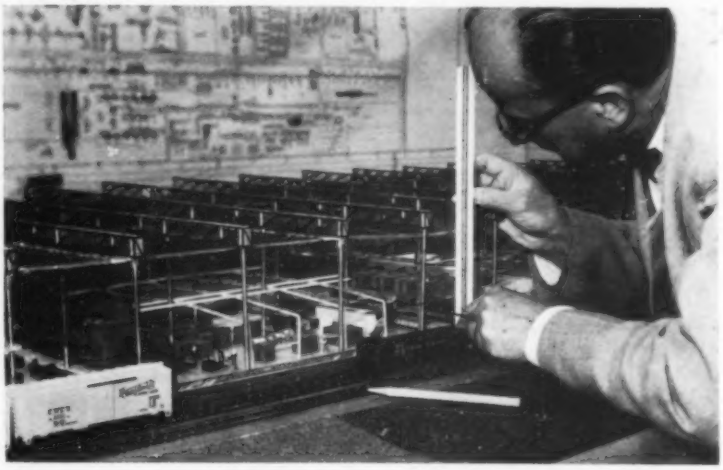
The steel industry went through a huge expansion program during the Korean War. It thought then it had enough reserve facilities to last for years. But for months now, steel has been short. Now the steelmakers plan to raise their capital spending by 72%—to put in $1.5-billion in new and modernized facilities this year. It is clear that the industry once again is launching a gigantic program.

Non-ferrous metals companies had much the same experience—and they are planning to boost their spending 54%.

Chemicals plan a 34% increase, petroleum refiners 13%. Paper and rubber companies plan a 30% and 24% boost in capital spending respectively.

Biggest surprise for many in the figures are the plans of the automobile makers. The industry has poured many billions into expansion since World War II. Close to 8-million cars were turned out last year. But the industry is setting its sights still higher. It is planning to spend $1.9-billion this year —68% above 1955 and far above 1954's earlier record.

In lines other than manufacturing, the gains are less spectacular percentagewise. Two groups will spend less—mining companies and electric and gas utilities.



A factory might be the best designed in the world — a model of efficiency. But without a DEPENDABLE WORKFORCE it would fail . . . Is absenteeism causing you trouble?

How to Keep Workers on the Job

Digested from PERSONNEL, Sept, p139

The worker who stays at home because of a sore throat and congested chest is wise. He safeguards himself and his company.

But the worker who stays at home because of a sore disposition and congested attitude is a burden to management. He is apt to be emotionally unstable, or sick physically from an unrecognized ailment, or alcoholic, or suffering from chronic inlaw trouble—or just plain lazy. In any case, his frequent absences cause a lot of trouble for his employer.

A successful plan for reducing absenteeism has been developed by Parke, Davis & Co., a Detroit drug concern. The company employs about 4,000 workers, half of them women. Until two years ago, when its plan was put into motion, Parke, Davis had a serious absentee problem. After much study and trial-and-error, a good solution was found. Here are the main points of the plan:

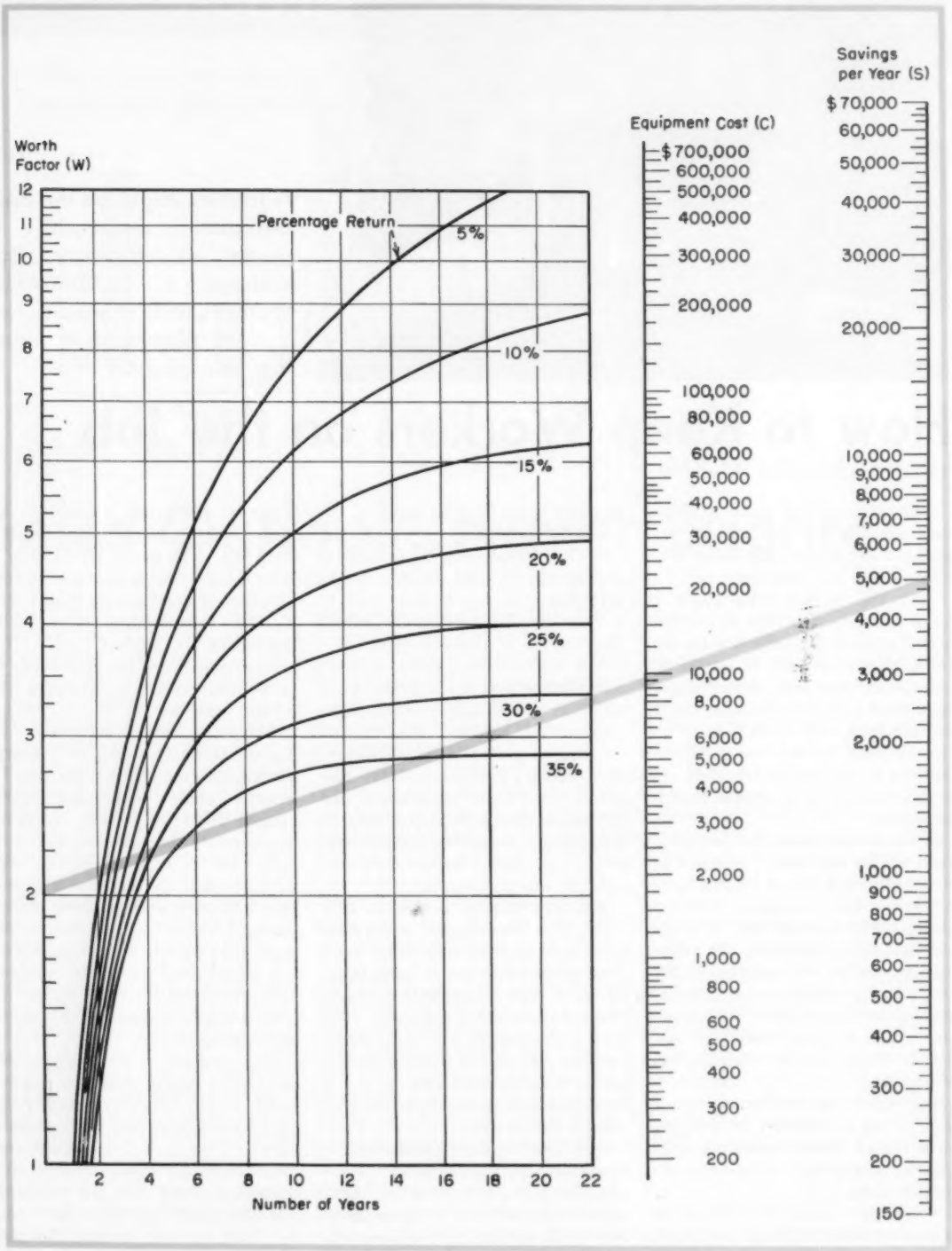
- Absence amounting to more than 2 days a month or lateness more than 3 times a month is considered "excessive." Corrective action is taken.
- Absence caused by illness or urgent personal business is excused and is not counted in the 2-day limit. In some cases, written proof of the excuse is required.
- The department supervisor is encouraged to keep an eye on the attendance of his workers and to discuss absences privately before they become a serious problem.
- A verbal warning, the lightest disciplinary action, is given when absences exceed 6 days within three consecutive months. The verbal warning is followed, if necessary, by a written warning, a 3-day suspension, a 30-day suspension, and discharge. These steps are taken in progression whenever absenteeism or lateness again becomes "excessive" in any one month.
- Before taking action in any case, the department supervisor must have facts to support his position. Attendance record cards must be used and, frequently, reports from the medical department. The back of the attendance record shows whether the worker notified his department in advance that he would be absent and, in any case, the reason for the absence.
- A "coordinating committee"—appointed by management — oversees the plan. It consists of eight supervisors and two or three members of the personnel-relations staff. The idea is to be sure that the program is uniformly applied in all departments and divisions of the company. The group meets once a month, for about 2 hours, to review all cases of absenteeism that might justify disciplinary action. The committee is advisory only. Its recommendations are intended to guide supervisors in handling absentee problems.

Absences have decreased at Parke, Davis in the past 2 years. Attendance records for the last 12 months show that absenteeism ranged from 3.3 to 4%. In some departments the rate was less than half what it was before the program began. In the past 2 years, the following actions were taken among 4,000 workers: verbal warnings, 131; written warnings, 76; 3-day suspensions, 24; 30-day suspensions, 6; discharges, 3. About 20 other chronic absentees "resigned" under pressure.

The program is well accepted by employees, union officials, supervisors, and company executives. Supervisors have had their morale lifted. They now know they can take corrective action to curb absenteeism — and that the company will back them up with a fixed policy. They can rely on set rules and avoid personal decisions.

Take a Ruler and . . . . Measure Y

Digested from HARVARD BUSINESS REVIEW, Sept-Oct, p81



reYour Replacement Costs

The Nomogram Can Help You Decide When to Replace Old Equipment. It's Part of a Money-Saving Formula

Suppose you have three people working on small-parts assembly. The operation is slow and inefficient. So for $10,000 you buy a machine that can do the job with only one worker. Yearly saving in wages, you figure, will be $5,000. You assume that your investment will be "recovered" in 2 years—that the machine will actually "pay" for itself in that time by cutting your factory wage cost.

Is the assumption valid? Possibly not. At least, it may not be a realistic basis for decision. It ignores the question of the profit you COULD have earned with the $10,000 had you used it in the routine operation of your business. Your decision, based on a 2-year recovery period, is apt to be way out-of-line in relation to true investments costs.

Suppose you had invested the $10,000 in inventory, for resale. Your profit on this inventory, even without the new machine, might have been, say, 20%. How can this 20% factor be entered into your decision on whether to buy the machine? How can this investment factor be considered in any decision to replace old equipment with new?

You can make the allowance, covering possible profits, by demanding that the new equipment (1) produce a certain saving, or increased profit, that would "pay" for the investment in a specified period of time and (2) earn an additional amount that would represent what you could have earned with the money had you put it into routine business operations.

In the example given, you figured that the new machine would "pay" for itself in 2 years—by lowering operating cost $5,000 each year. On the day the machine was installed, since no benefit had yet been derived, none of the $10,000 investment would have been recovered. At that point, the unrecovered investment would show a balance of $10,000. This balance would decline, evenly, from $10,000 down to $0.00—and would reach $0.00 at the end of 2 years.

To enter the "possible profit" factor into your decision, you now demand (1) that the machine "pay" for itself in 2 years at the rate of $5,000 per year and (2) that it earn 20% (yearly) on the "declining" (unrecovered) balance of the invested capital.

The nomogram (at left) gives the adjusted recovery period and shows you exactly the relationship among: (1) the $10,000 initial investment, (2) the $5,000 yearly saving, (3) the 20% additional return on "unrecovered" investment, and (4) the period of capital "recovery." This recovery period (4)—if realistic—can form a proper basis or standard that can be applied to possible new equipment purchases.

The correct, or adjusted, recovery period in the example is 2.8 years. Follow the orange line on the nomogram. It gives the result.

Draw a straight line between $10,000 on Scale C (equipment cost) and $5,000 on Scale S (savings per year). Extend the straight line until it touches Scale W (which shows the simple recovery period without the "possible profit" factor).

From this point on Scale W (2 years), read to the right horizontally to the 20% return, or profit, curve. Then from this point of intersection on the curve, read straight down to get the time-value on the base line—2.8 years. (You can reverse the process, starting with a given capital recovery period and working out answers for different combinations of savings and equipment cost.)

This means that the new machine will "pay" for itself in 2.8 years, not in 2 years. You are now in a position to make a reasonably accurate estimate of the true investment cost in terms of your particular financial situation.

The return-on-investment goal of a company depends on many factors—the type of business, the rate of return on the existing investment, the supply of working capital in relation to investment capital, and, especially, the viewpoint of management in regard to the use of capital.

The "goal," or investment standard, can be easily established, or defined, in terms of specified capital recovery periods. These fixed periods—for example, 2 years for new machine tools—act as guides to management in deciding when to buy replacements. They amount to a standard of performance by which the new equipment can be measured—a "screening method."

An equipment replacement policy is needed by most firms. Hit-or-miss methods for deciding whether (or when) to replace old equipment lead to costly mistakes. Investment know-how is needed. That means developing a fixed standard or formula to apply to each replacement decision. It should cover these points:

1. Cost savings or increased profit afforded by the replacement.
2. Rate of return expected on the unrecovered balance.
3. The capital recovery period in relation to equipment life.
4. Service life of the proposed equipment in relation to wear and obsolescence.
5. Money available for replacements in relation to money available for operating expenses.
6. Net savings per year in relation to service life.
7. Relation to other replacements in terms of priority.
8. The effect on taxes.

Delegation: the Key to Executive Efficiency

Digested from FACTORY MANAGEMENT & MAINTENANCE, Nov, p90

No matter how good an executive you are, your duties will always be greater than your capacity to carry them out. That is not a criticism. It's an accepted fact.

The answer to this occupational riddle that plagues many a businessman can be expressed in three words: delegation of authority. Too frequently, though, the businessman refuses to accept this simple truth of executive life. Too frequently, we might add, he falls victim to a heart attack or ulcers!

There are two types of men who have failed to learn the lesson of proper delegation. One refuses to delegate authority and duties to his subordinates—he strives to get things done on his own power. The other heads for trouble in the opposite direction—he over-delegates and loses control.

The trick of delegation, of course, is to handle important matters personally and leave the less important details to others. Delegation is a sanity-saver if practiced artfully. It gives you freedom of action, allows you to focus attention on the areas of your job that need it most. It gives you more time to spend on important long-range planning. And it keeps doctor bills to a minimum!

Moreover, in addition to benefitting you—the executive—delegation can do much for staff members. Your managerial "team" can be built more solidly. Enlargement of a subordinate's job helps develop his sense of loyalty and responsibility, increases his job satisfaction, and, most importantly, develops his ability and his practical value to the business.

When and how to delegate simply cannot be expressed in terms of simple rules. Delegation is an art, not a simple skill. But there are some fairly general points that should be stressed:

- **When delegating responsibility, give the subordinate a clear and complete picture of the job.** Give him all the authority he needs and define that authority. Make it clear just how the job fits into the whole scheme of the operation and define its relative importance.
- If the assignment will bring him into contact with new people, in other departments or in outside companies, introduce him in these places yourself, if possible. And be sure to make the delegation of authority clear in the minds of all concerned.
- Explain to the delegate why you chose him for the job. Prepare him psychologically. He may lack confidence or feel overburdened. Lessen the tension by indicating your confidence in his ability. Make it clear that you are available for further discussion if needed. Never create an atmosphere of crisis as a means of getting things done.
- Set harmony as a goal, but reserve the right to discipline. Impress your delegate with the need for harmony and "team-work" on the job. Do not place him in a position where it would be easy for him to abuse his new authority in dealing with others in the company. Do not let him enforce cooperation on your behalf. Explain to all concerned the need for delegating the job.
- Retain control at all times. When you delegate, you do not really lessen your basic responsibility; you merely assign the duties that arise under that responsibility.

Your instructions should usually include a standard operating procedure—rules by which the subordinate can handle situations that will occur many times. Examination of the results, then, is the easiest kind of control you can exercise.

- Progress reports and follow-ups are often needed. Do not wait until a major delegated job is finished to check on progress, unless you have decided in advance that your interference would hurt the operation. On the other hand, do not be tempted to inspect the delegated job too often, else the very purpose of delegation will be defeated. Remember that the ability to make managerial controls work effectively—and control of a delegated job is a good example—is a major test of a man's executive ability.

Be prepared for trouble. Delegation is no cure-all. It is very apt to produce inefficiencies and hurt feelings. Its short-range effect, especially, is often a great disappointment. Its long-range result will never be entirely satisfactory to you as one man will never do a job in exactly the same way as another will.

Then why pursue it? Because delegation is necessary if complex business operations are to be carried out. Face the facts. The delegated job will not be done quite the way you would do it. But it will be done, usually in reasonably good style. If a delegated assignment ends in turmoil, and you are inclined to take drastic steps—better not. It is probably time for you to review your method of delegation.

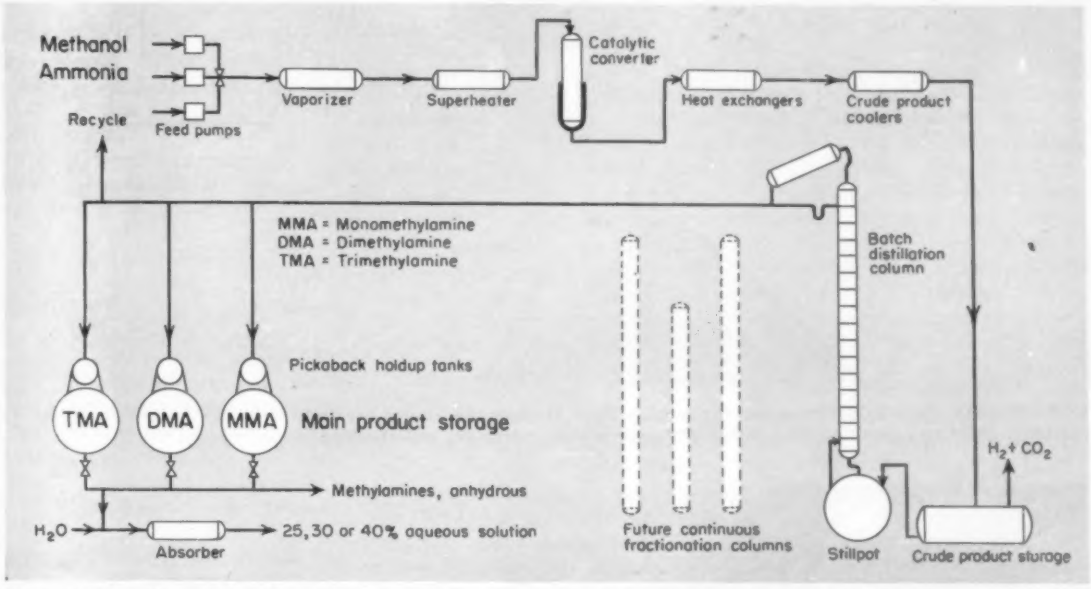
▶ New

A team of Japanese businessmen, recently returned home from a tour of the U.S., have decided that more "scientific management" is needed in Japan. They intend to see that consumer surveys, marketing, efficiency control, and similar techniques are developed on a modern scale. Their starting point: Japan's universities.

Digested from AMERICAN LETTER, Oct 15

Executive recruiting firms have been thriving. There are now 20 in New York alone, most of them started in the last year or two. They specialize in placing executive talent, acting as employment agencies for high-bracket men. Their biggest problem: getting clients to realize that administrative skills are transferable from one industry to another.

Digested from BUSINESS WEEK, Nov 12, p126



U. S.-designed methylamine plant, noted for ease of maintenance and repair, shows how . . .

Good Design Can Cut Operating Costs

Digested from CHEMICAL ENGINEERING, Nov, p122

Cost-cutting features that can be applied equally well to many other plants feature a new methylamine plant in Yokohama. Designed by Brown, Blauvelt, and Leonard, a New York engineering firm, it is operated by Nitto Chemical Co., a leading Japanese chemical manufacturer.

• **Capital Investment**—The new plant cost $250,000. Capital equipment investment is 40% smaller than in comparable older plants. Methanol, ammonia, and recycle liquid feed a high-pressure synthesis system consisting of vaporizer, superheater, converter, heat exchangers, coolers, and receiving tank.

Only one vaporizer and one superheater are needed in place of the five each in older plants. Also, they are heated by electricity instead of high-pressure steam; this substitution accounts for major savings in equipment costs.

A single distillation column replaces the dual columns used for batch operation in the U. S. When the plant is converted to continuous operation, four bubble-plate columns will do the work that now requires seven to ten columns in U. S. practice.

This reduction in equipment also saves on process piping, wiring, and utility connections. Fewer instruments are needed.

Despite the simple design, the plant retains complete process flexibility. It produces mono-, di- and trimethylamines in any desired proportions by recycling unwanted products through the converter to suppress forming of that product.

• **Lower Maintenance Costs** — Another noteworthy feature of the plant is its easy maintenance from its being built at ground level. Usual practice is to hang some of the processing equipment on the supporting structure of the fractionation column. But this raises costs of rigging, scaffolding, and extra labor needed for maintenance.

Unusual design thinking has been applied to the product storage part of the plant. Before each product passes into its storage tank, it must await analysis in a small holdup tank. These three tanks, instead of being built on separate structures, are mounted, "pickaback" style, on top of the main storage tanks. This arrangement cut costs of structural materials and installation.

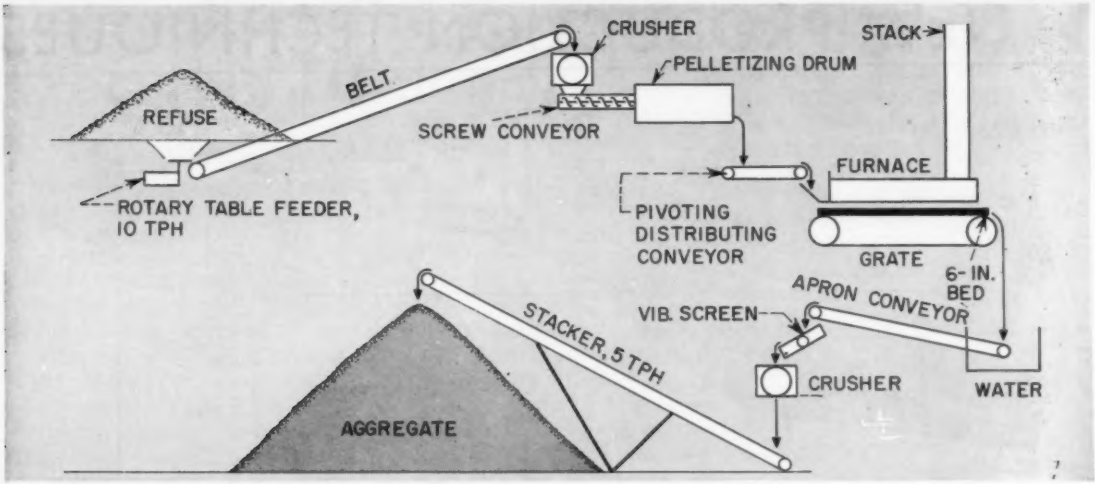
Plant capacity is 1-million pounds a year with batch operation. Converting to continuous operation will triple the capacity. Yields are better than 90% on both ammonia and methanol.

• **Market for Chemicals** — The methylamines will go into a variety of products. A major use is for dimethyl formamide, a solvent for acrylic synthetic fibers. While Japan is not yet making acrylic fibers, it is expected to enter that field soon. Other important uses include:

Monomethylamine in the manufacture of synthetic ephedrine, vat dyes, and tetryl.

Dimethylamine in rubber chemicals and fungicides.

Trimethylamine in drugs, animal feeds, and detergents.



CONVERSION PROCESS—From settling pond to final storage pile, refuse is converted to lightweight aggregate by crushing, pelletizing, burning on a chain grate, quenching, screening, and crushing.

COMPLETED PRODUCT—Crushed to 3x0, Trulite aggregate is stacked in a 1,000-ton pile from which it is loaded into railroad cars or trucks. Trulite makes building blocks that are light in both color and weight.

There Is Profit in Coal Waste

Digested from COAL AGE, Nov, p78

Faced with an ever-growing coal-refuse disposal problem, Truax-Traer Coal Co. (West Va.) neatly solved it at a profit. The company's trick: turning the waste material into a lightweight aggregate suitable for building blocks.

Trulite Corp. does the converting. Blocks made with the aggregate are lighter in color and weight than cinder blocks. They are free from any combustible, iron, or other substances that might cause stains or other flaws.

The present Trulite plant turns out 120 tons of aggregate per day. Initial investment was about $100,000. As the market grows and product acceptance increases, capacity of the plant will be tripled.

Waste material consists of ½x0 reject from Truax-Traer's Ceredo washery. This material is pumped to the settling ponds at a rate of more than 200,000 tons per year. It contains 40 to 50% combustible, some of it coal but most of it carbonaceous shale.

The Trulite plant was designed for as nearly automatic operation as possible. The day-shift crew consists of one operator and one clamshell man. On the other two shifts a lone operator comprises the crew. Total number of employees is five, and no more men

will be added when the plant is expanded.

The first equipment item in the flow sequence is a power scraper with a 1½-yard bucket that pulls the refuse from the pond to a drainage pile. An operator handles the scraper during the day. At night the bucket cycles back and forth automatically from the drainage pile to a point above the recovery tunnel. The operator sets it going about once every hour and each time permits it to make three or four cycles.

The recovery tunnel was fabricated from corrugated tunnel liner. The feeder to the 14-inch belt conveyor coming out of the tunnel is a 26-inch rotary-table unit with plow. It has a variable-speed drive controlled from the furnace operator's booth. After passing under a tramp-iron magnet, the material is reduced in a hammer mill to a size that will pass through a ⅛-inch screen.

A screw conveyor moves the material into a pelletizing drum, which turns at 10 revolutions per minute. If the material is not wet enough, water is sprayed into the drum to make it "ball up." As the material leaves the drum, less than 10% will pass through a ⅛-inch screen. A horizontal belt conveyor pivoted at the feed end delivers to the furnace dropper. An air cylinder pivots the conveyor automatically to distribute the material evenly and prevent segregation. The chain grate of the furnace is 10 feet wide and 35 feet long. Effective grate surface is 10x30 feet.

When the material burns, it forms a clinker cake about 6 inches thick. A small amount of water sprayed onto the bed above the last 18 inches of grate cools the cake somewhat and produces a brittleness that helps gravity break off segments of the cake as it overhangs the end of the grate. The cake is then quenched.

From the quench tank a conveyor carries the cake through a shaker and into a single-roll crusher that reduces it to 3x0.

A stacker moves the aggregate to a 1,000-ton pile. A clamshell loads either railroad cars or trucks for shipment to users.

Powdered Metal . . . You Can Now Roll It to Sheet

Digested from METAL PROGRESS, Oct, p115

As the number of metals available in powder form increases, new and modified fabricating techniques are needed to extend their use. Standard powder-metal methods are complex and costly. So to replace the casting, rolling, and drawing practices now in common use, new methods are needed to form rod, strip, and tubing rapidly and continuously from powder.

One way, suitable for both ferrous and nonferrous metals, is to compact loose powder into green strip or rod between rolls, to sinter, and then to reroll. Rolling and annealing give the required mechanical properties.

• **Powder from Scrap**—A technique developed by Chemetals Corp. (New York) not only prepares strip and wire from copper powder, but also recovers the powder from low-grade scrap. The first plant is already in operation at the Whitaker Metals Corp. (North Kansas City, Mo.).

The scrap used is low enough in grade that it cannot be remelted into ingots of good quality. Furnace ashes from brass and copper turnings, sweepings, clad iron scrap, motors and armatures, automobile radiators, and other low-grade scrap are processed to yield top-quality copper as a powder. By-products of the process are zinc, tin, lead, nickel and steel.

• **How Method Works** — Scrap, freed of organic contaminants, is leached with an alkaline cupric ammonium carbonate solution. Cupric iron is reduced to cuprous, while copper, zinc, and a few other metals, if present, are dissolved. The solution is oxidized, then purified to remove solids, colloids, and trace solubles of iron, lead, tin, silica, and manganese.

The solution is then reduced in an agitated autoclave at 350°F., under a gas pressure of carbon monoxide or hydrogen at 1,000 pounds per square inch. About one-half the copper precipitates as a freely flowing powder of high quality. The liquid from the autoclave passes on to the zinc removal stage where some of the zinc is removed as an oxide or carbonate. The rest of the liquid is recycled.

The powders produced by carbon monoxide reduction are coarse, spherical, and of high density. Those reduced by hydrogen are fine, sharp, and of low density. Properties of powder compacts differ too. Sintered tensile strengths are higher for hydrogen-reduced powder—over 16,000 pounds per square inch compared to about 12,000 for carbon monoxide powder. Elongation is higher too.

• **Roll Bonding**—This operation is carried out by feeding freshly reduced powder from a hopper to the rolls. The rolls may be designed for roll bonding to either wire rod or strip. The green strip (that is, unsintered strip) is strong enough for careful handling.

Rapid sintering at high temperature (1800°F.) increases the strength sharply. Additional rolling with intermediate annealing between rolls further consolidates and reduces the strip.

Shaping strip from powder to a thickness of perhaps three to ten times the final desired thickness gives a marked advantage. It eliminates the casting shop, the heavy machinery for reducing large ingots, and the scrap loss of cropping and trimming. Solid strip results if the metal is kept clean and free from impurities.

Typical properties of rolled strip, say of 0.0106-inch thickness, run over 40,000 pounds per square inch in tensile strength and 34% elongation in 2 inches.

• **Metals Rolled** — Metals that have been roll-bonded are copper, brass, bronze, iron, nickel, and silver.

Well-mixed powders also can be bonded and the alloys created in sintering by diffusion. This method of making alloys is especially good for metals of widely different melting points or of high volatility.

Maintenance Cost Cut 20%

- You can do it—just follow Du Pont's method
- It's a simple 18-point plan, tried and tested
- The quality of products is not sacrificed
- You can alter the plan to fit your business
- Best of all, it can apply to any size company

Digested from FACTORY MANAGEMENT & MAINTENANCE, Nov, p123

Du Pont, the giant chemical concern, has developed a program that can serve as a guide for improving any maintenance operation, big or small. To get the most for its maintenance dollar, Du Pont uses 18 basic administrative tools. Each tool helps to lower cost and boost output.

Application of the program could be expected to vary from plant to plant, as it does within the Du Pont organization. Some Du Pont plants have cut maintenance costs 20%. In many cases, the effectiveness of maintenance labor has "improved from the range of 35-40% to that of 60-65%."

In all Du Pont plants, the reduction of equipment "downtime" and the increase in productivity have alone justified the cost. Here are the 18 points, listed in logical order:

1. Organize the plan. Set up a separate maintenance control group. Give it full charge of the maintenance system. Make it a regular, responsible department of the business.

2. Use a work-order system. This is the cornerstone of maintenance control. Use a printed work-order form which requires that every maintenance job be requested in writing. Set up a work-order record file.

3. Keep equipment records. A record card for each piece of equipment is valuable. It provides a permanent record of the maintenance performed on each piece and the cost. It also ties in with an equipment replacement policy.

4. Analyze and plan jobs. Each repair order must be examined closely. The examiner decides exactly what needs to be done, what parts are needed, what tools are needed, and the number of man-hours required.

5. Make a weekly forecast. Set up a schedule for each week—2 or 3 days in advance. Outline the next week's maintenance jobs. This stimulates the idea of preventive maintenance.

6. Prepare daily schedules. Do this each afternoon, for the next day. There is then no waiting for assignments by maintenance men the next morning.

7. Set up a manpower control. This means keeping records of the manpower used on all major types of maintenance jobs. A control of this kind will tell you when you have too large or too small a crew for maintenance in a particular department.

8. Use preventive maintenance. Do maintenance when you *want* to do it—not when you *must* do it because of equipment breakdown. Plan the work and do the work in advance. Du Pont does most of its maintenance on the day shift, and at an even rate. Manpower is continuously busy, not working in surges. This decreases overtime and night-shift pay.

9. Use budgetary control. Set up a maintenance budget on an annual basis, broken down into monthly divisions. The yearly budget should be fixed; the monthly budget should be allowed to vary within the 12-month period.

10. Provide material control. Insist on keeping materials for maintenance in an established and separate store. Keep accurate stock records. Do not let maintenance men have their own private supplies of critical materials. It's a costly practice.

11. Plan your plant shutdowns. See that maintenance and replacement shutdowns are planned to disrupt production as little as possible. Fit maintenance work to the production line.

12. Develop standard practices. These are detailed written instructions, or work manuals, for standard maintenance jobs that occur frequently. The maintenance work will be handled faster and can be done by less skilled men.

13. Set up major procedures. For big maintenance jobs, the standard practices are not concerned with small details, as in the case of routine repetitive jobs. The written procedures outline methods, over-all steps, new parts required, number of men probably needed.

14. Use work measurement. As soon as you have set up standard practices for repetitive maintenance jobs, you can insure their most effective use by having the timestudy men fix standard times for them. You will discover areas where labor is inefficient and the reasons why.

15. Improve your equipment. Try to make critical repair parts and materials quickly available and thus simplify maintenance.

16. Train your supervisors. Be sure they understand the maintenance-control program. And give the program the full support of top management.

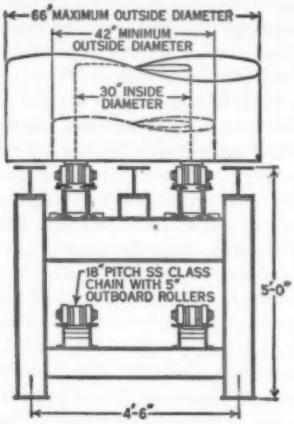
17. Train your maintenance men. Give them as much attention as you would a skilled production worker.

18. Analyze performance and costs. Try to make your maintenance program constantly more efficient, less costly. Compare department costs, and concentrate on high-cost areas.

An equipment-record card system is a most valuable tool, according to Du Pont (see point 3). It deserves special mention. The job of maintenance cost control is practically impossible without such a system. Your equipment records should be as complete and accurate as inventory control records.

How these LINK-BELT coil conveyors provide FASTER COOLING, EXTRA LIFE

In mill at Denain, France, two Link-Belt conveyors carry coils from downtilters to lift-and-turn transfers, which deposit them on a 6-degree inclined conveyor moving to storage.



Link-Belt chain designed for use on these conveyors has ultimate strength of 340,000 lbs., 18-in. pitch, and is supported by 5-in. dia. cold rolled steel outboard rollers. Despite constant exposure to intense heat, chains continue to give excellent service after 3½ years. In cross-section drawing of conveyor, note how construction facilitates cooling.

First French hot strip mill gets maximum safety, minimum scuffing

When United Engineering and Foundry Co. of Pittsburgh was appointed to build France's first continuous hot strip mill, it turned over to Link-Belt the job of designing and furnishing a conveyor system with capacity for handling 25,000-lb. red-hot coils from coilers to storage area. Adding to the challenge was the need for fast cooling prior to storage.

Resulting Link-Belt facilities carry from 500 to 550 coils during an average 18-hour work day . . . on four extra-rugged chain conveyors totaling 600 ft. in length. Each coil is supported in a manner which permits free circulation of air around and beneath it, thus lowering temperatures sufficiently to lessen scuffing when coils are unloaded.

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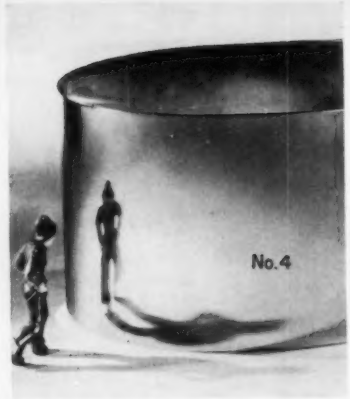
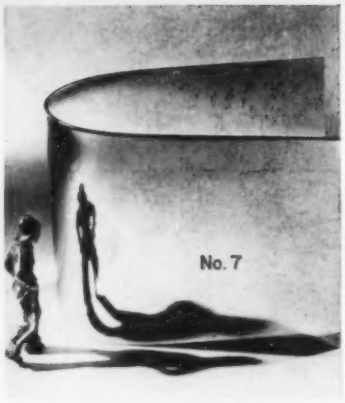
NO. 2B FINISH, bright and dense, shows some reflectivity



NO. 4 FINISH, the most popular, is bright and has good luster



NO. 7 FINISH has high luster, only slightly inferior to "mirror-finish"

What You Should Know About . . .

Finishing Stainless Steels

Digested from AMERICAN MACHINIST, Nov 7, p129

From the common "as-rolled" surfaces on stainless steel to the "mirror finish" desired on many electrical appliances, careful attention must be paid to finishing methods and equipment to get the best economy and ease in production. This you can do by establishing finishing routines to meet your production needs.

The first step is picking the right starting finish. In many cases, mill polishes can be used, making further work unnecessary. Or the fabrication method itself may yield the finish desired, such as roll forming of automotive trim.

As a rule, pick the mill finish that most closely matches your final finish or provides the best start for forming and subsequent polishing. Mill finishes include:

No. 1—hot rolled, annealed, and pickled. Use when appearance is not important.

No. 2D—cold rolled and pickled. Use when severe forming is to be followed by polishing.

No. 2B—cold rolled. Use when light forming is to be followed by polishing, as for industrial and transportation equipment.

No. 4—polished. Use when forming will not mar surfaces or as a base for Nos. 6, 7, and 8 finishes. This is the most common finish. Uses include architectural trim and kitchen equipment.

No. 6—Tampico brushed. Use for decorative finish.

No. 7—polished to high luster. Use for decorative finish.

No. 8—polished to mirror finish. Use for decorative finish.

• **Grinding and Polishing**—The most popular finishes used on stainless-steel parts are those equal to No. 4 mill polish. This finish is obtained by a rough grind, finish grind, rough polish, and finish polish.

For rough grinding, solid rubber or Bakelite wheels are preferred to vitrified wheels as the latter load and cause overheating. Grit should be 20 to 60, and grinding done dry at 5,000 to 6,000 feet per minute. Finish-grinding wheels have 60 to 80 grit.

For rough and finish polishing, wheels are available in different materials and types of construction. Most common are cloth wheels that can be loose, glued or sewed disks to provide different degrees of stiffness. Abrasive, along with tallow or grease as the lubricant, is applied in stick form—80 to 100 grit for rough polishing and 120 to 150 grit for finish polishing.

All four operations may not be needed. Rough grind is the starting operation for rough weld beads; finish grind for heavy sheet, hot-rolled finishes, light welds; rough polish for cold-rolled sheet or strip.

• **Buffing**—Finishes 7 and 8 require buffing, although No. 7 can also be obtained without buffing by using a 320-grit abrasive in polishing. Buffing consists of two operations—cutting and coloring. Special abrasive compounds designed exclusively for stainless steels are available. Bias or sewed buffs are suitable for cutting, and bias or loose buffs for coloring.

Color buffing should be a short operation. Buff only until the true color of the metal is brought out. Don't expect buffing to remove surface imperfections.

• **Finishing Small Parts**—Two methods are particularly adapted to small or complex parts: barrel finishing and electropolishing. The first is preferred for very small parts, while part size for electropolishing depends largely on the equipment available.

Small stampings, cold-headed parts, and screw-machine parts are best for barrel-finishing, which may be done either for burr removal or ball burnishing. To remove burrs, work is tumbled in rotating barrels with granite chips, aluminum oxide, silicon carbide, or sharp silica sand. Wet tumbling, with water and quite often soap added, gives a more uniform finish. Larger amounts of water improve the finish.

Ball burnishing follows burr removal when a high finish is desired.

The work is tumbled with stainless-steel balls, cones, disks, or pins, plus water and burnishing soap.

Electropolishing has gained wide acceptance as a cheap means of polishing small or complex parts. Baths are based on sulfuric or phosphoric acid. The work serves as the anode and copper or lead as the cathode while a direct current is passed through the bath. Electrolytically polished surfaces have a high luster and are extremely smooth. Such finishes will last a long time and cannot be duplicated by mechanical means.

• **Decorative Finishes**—The finish on stainless-steel parts may be varied to get contrast for appearance or to serve a definite purpose. Among the methods of doing this are mechanical or chemical etching, blackening, coloring, plating, and enameling. Painting is generally not recommended.

Mechanical etching consists of placing a mask or templet over the area to be etched and altering the reflectivity of the surface by grinding, sandblasting, brushing, or some other means. Etched areas stand out prominently from polished areas.

Deeper, more complex designs can be obtained by chemical etching. Areas not to be etched are protected by "stop-off" materials; the remaining areas are then etched by acid to the depth desired.

Blackening of stainless-steel surfaces is done by nickel plating, copper plating followed by immersion in ammonium sulfide, immersion in hot chromic acid, or immersion in a patented sodium chromate bath. Finishes of this type are not widely used.

Plating may be desirable in some cases, as chromium plating on automotive trim to obtain a color match. Copper plating reduces galling and provides lubrication in spring forming. It gives better heat distribution, as on cooking utensils. Stainless steels can also be plated with cadmium, silver, and gold. Prior to plating, stainless steels require cleaning and activation by cathodic treatment or immersion in acid.

Enameling is a comparatively new treatment for stainless steel. Stainless is expected to be far superior to any other material for the use of enamel for decorative purposes.

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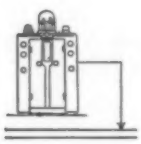

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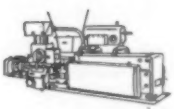

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Equipment includes chemical solution feeders, gravimetric and volumetric dry feeders, and gravimetric meters for use in the chemical, grain, and food processing industries.

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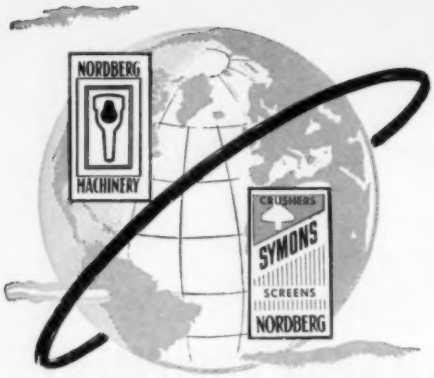

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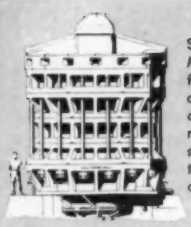

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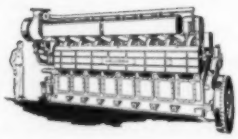

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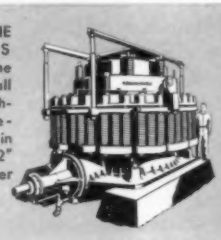

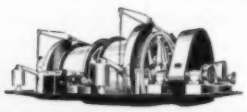

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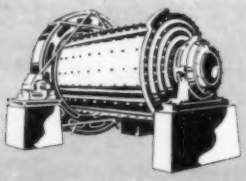

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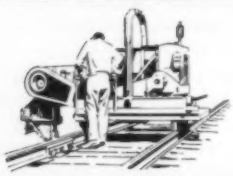

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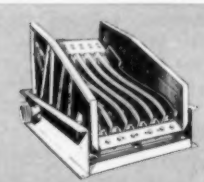

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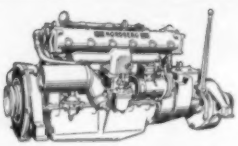

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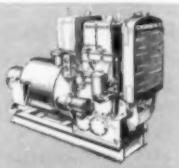

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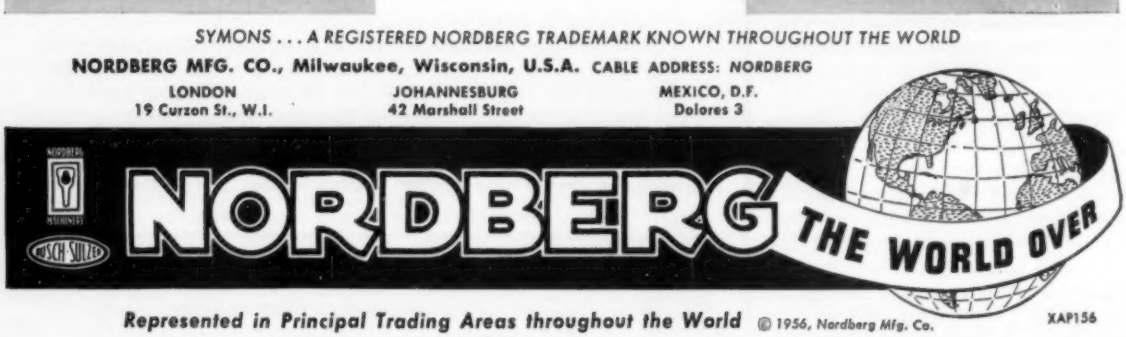

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FIRST BIG USE of Goodrich Darlan fiber will be in women's pile coats to compete with the Dynel-Orlon pile fabric

New Fiber with a Future

Digested from CHEMICAL WEEK, Nov 12, p81

B. F. Goodrich Chemical Co.'s new synthetic fiber is still somewhat of a mystery, even though it's ready for commercial production. Goodrich has revealed just this: name—Darlan; chemical nature—dinitrile polymer; production status—pilot plant; first commercial use—women's pile coats.

Limited production is underway at Avon Lake, Ohio, and at least one manufacturer (George W. Borg Corp.) is now making deep-pile fabric of the fiber. It's reported to be even more fur-like than the Dynel-Orlon blend now used in most such coating material (MD, Nov '55, p44).

Even though Goodrich Chemical has not unveiled its processes, a fair guess can be made from patent literature. Vinylidene cyanide polymers are prepared by heating a benzene solution of the monomer in the presence of a catalyst—*p*-methoxybenzene naphthyl sulfide. They are hard, tough, clear, and resistant to heat and chemicals. Filament produced from the polymers has shown a tensile strength of 51,000 pounds per square inch.

Filaments may be produced also from copolymers of vinylidene cyanide and vinylidene chloride, and other chemicals. Although Darlan is predominantly polyvinylidene cyanide, its precise composition is secret. It could contain a copolymer-forming compound.

No secret, however, are its potential uses. According to the company, Darlan "can be adapted for almost every type of wearing apparel, ranging from sweaters and knit goods to coats and suits." Men's suits, overcoats, and sweaters were test-worn by Goodrich employees. About 5,000 Darlan women's coats will soon be sold through ten carefully selected stores. A big market potential exists here—if the women buy.

Other markets are open too. Automobile makers who have been shown the fiber see a future for it in seat upholstery. But output must first be substantial before this market can be touched.

Meanwhile, research continues. Goodrich researchers face problems long familiar to producers of Darlan's acrylic and nylon relatives. They are looking for a good static-eliminating compound that will not disappear from the fabric after a few cleanings. They are looking too for ways to improve the draping qualities of Darlan. Goodrich also has more than a fiber to consider. Vinylidene cyanide can yield rubbers, films, and casting and molding resins.

For Short Runs . . .

. . . of experimental parts or for small-lot output, short-run stamping can cut your piece cost

Digested from PRODUCT ENGINEERING, Nov, p174

Short-run stamping methods can generally apply to any size or shape of part that can be blanked, pierced, formed, or drawn from any material. They are well suited to:

- Economical production of experimental parts.
- Where quantities are limited —100 to 10,000 parts, although runs as small as 10 parts may be practical and runs over 10,000 can often be made on low-tensile, non-abrasive material.
- Where changes or improvements are expected during the production run.
- When the least time from design to finished part is required.

The methods used in short-run stamping differ from those for high-production stamping. Presses are often the same, but fancy and expensive fixtures and automatic feeding devices are avoided. Universal die plates with inserts that can be changed and adjusted are used to cut setup time.

Dies may be made of almost any material, depending on material and shape being formed, number of parts wanted, and tolerances. Wood, plastic, and steel are the most common tooling materials in use today.

To keep short-run costs low, here are ideas easy to apply in any shop:

1. Keep all tolerances as large as possible.
2. Do not specify cold-rolled strip steel if cold-rolled or hot-rolled (pickled and oiled) sheet will do.
3. Use the lightest-gage material possible.
4. If burr removal is not important, do not specify it as the extra operation boosts the costs.
5. Avoid small holes too close to the edge.
6. Allow enough relief around forms when bends are close to the edge of the blank.

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Modified Welding Torch Cuts Nonferrous Metals

Digested from WELDING ENGINEER, Nov, p51

A variation of tungsten inert-gas welding has given the industry an entirely new process for cutting and shaping nonferrous metals. The cutter was developed by Linde Air Products Co., a division of Union Carbide & Carbon Corp.

A high-temperature, high-velocity, constricted arc is maintained between the tungsten electrode and workpiece. Jet-like action of the concentrated arc energy ejects a thin section of the molten metal to make the cut.

A mixture of argon and hydrogen gas prevents oxidation of the cut surface. Normal mechanized cutting speeds are 300 inches per minute in ¼-inch aluminum, 125 in ½-inch, 75 in ¾-inch and 50 in 1-inch material.

The cutting torch differs from the welding torch in having a new collet and collet body with water cooling tubes inside the body, a nozzle with a replaceable, hard-drawn copper insert, and a "pilot-arc" circuit to initiate the arc.

New

Freezing stainless steel and then working it at sub-zero temperatures allow severe forming and bending that would crack the steel at room temperature. That was revealed by research at International Nickel Co.

Stainless steel, like other metals, increases in tensile strength when chilled. But unlike other metals, stainless steel also increases in ductility. Elongation of type 302 (18% chromium—8% nickel) in the ½-hard condition more than doubles at −150°F. The gain in properties results from the rate of work hardening at low temperatures.

When the steel is warmed to room temperature, it retains its properties, even up to 800°F. As the steel can be strengthened to the same degree with less working than at room temperature, it retains much greater ductility.

Digested from AMERICAN MACHINIST, Oct 24, p152

BEFORE BUILDING THIS office, firm checked aspects of structure.

FIRM BUILT THIS full-scale mock-up so both architectural staff and the people who would use the new building could visualize what it would look like.

FLOOR LAYOUT in mock-up is studied. Tape on floor shows layout.

CUTAWAY MODEL helps staff discuss ideas obtained from experiments.

Mock-Up Saves Mistakes

Digested from ENGINEERING NEWS-RECORD, Oct 20, p50

Test the idea first. If results look good, then plunge in full scale. That way you save future headaches. It makes sense, but how do you apply it to building? Connecticut General Life Insurance Co. wanted a new office building. But when it surveyed new materials, equipment, and techniques it found itself buried under more information than it could handle. Its solution: build a full-size mock-up of a small portion of the new building and then experiment.

Plans were drawn up for a simple, temporary structure, with only such heat and mechanical services as would be necessary to make the building usable year-around. It was decided that the structure would be two stories in height and 60x72 feet in dimension.

In particular, these were the things the company wanted to test: interior finishes, lighting schemes, floors, furniture arrangements, partitioning systems, ceiling materials, and wall finishes.

The first and most important test was that of lighting. As the architects developed their design conception, they devised a completely new open-baffle, bare-fluorescent-tube ceiling system. On paper it seemed to have real merit from the standpoint of efficiency and pleasant lighting, good acoustics, simplicity of maintenance.

This was one feature of the ceiling: It left exposed all the steel beams, the sub-floor overhead, sprinkler pipes, air-conditioning ducts, electrical raceways, and all the mechanical services that are usually hidden behind a dropped ceiling. This feature brought up the question of whether or not a good design on paper would prove as good in reality.

The obvious thing to do was to mock up a section of the proposed ceiling, complete with all the elements that would be seen through it. Experts were then called in for discussion and evaluation. These sessions not only satisfied almost everyone as to the basic quality of the baffle ceiling, but served the further purpose of enabling several improvements to be made before the ceiling was actually put into production.

Certain things that appeared to be good on paper were proved otherwise. One suggested modification in the basic ceiling system would have separated the baffles and acoustical material from the electrical installation. Paper analysis of the separate systems, as against the system combining the two, indicated that installation of the dual system would be simpler and cheaper.

The company tried out a section and found that the separation not

only contributed no saving but resulted in an increase in the cost, as well as harming the finished appearance. Connecticut General feels fortunate that it found out before ordering 35,000 square feet of ceiling.

Experiments were conducted with a newly designed and simple type of movable partitioning. Here again, the only way to evaluate the effectiveness and the appearance of the new system was to make some partitions and try them out. Results proved highly acceptable.

The objective was to get something that looked as well as it worked, and vice versa. Color, design, and detailing of all equipment were studied in relation to its function and appearance in the new structure. All this careful study led to the adoption of a standard 144-square-foot office. Earlier the company had expected to need 180 to 200 square feet for a suitable standard office.

Actual decisions in each instance were arrived at not only by careful inspection of the physical and engineering characteristics of products tested, but by detailed initial cost comparisons prepared by the contractor. Wherever it was appropriate, further studies were made as to long-time operating costs. With lighting systems, power consumption per foot is a factor both directly and indirectly because it affects air-conditioning loads.

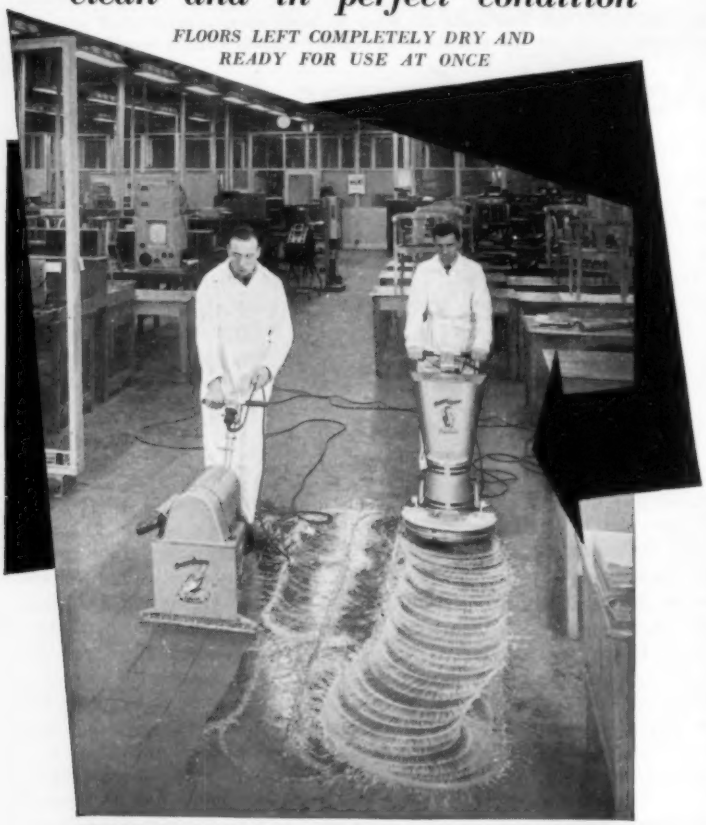
With floors, the question of ease and cost of maintenance, ability to resist indentation, the possibility of replacing damaged sections, and other factors all entered into the decision.

The costs of the mock-up and the experiments in it appear fairly substantial until they are related to the cost of the project as a whole and to the possible savings that pretrial effected. Connecticut General estimates the total out-of-pocket expenditure to amount to something like 1% of the total cost of the project. That includes the actual cost of the mock-up, the cost of its demolition, and the cost of all experimental work carried out in it.

Actually, the cost of the mock-up may be negative, though the point can never be proved. The real economies lie not in the actual cost savings but in the much greater assurance that the company's new building will provide the facilities best suited for carrying out its business.

Modern machines that keep floors clean and in perfect condition

FLOORS LEFT COMPLETELY DRY AND READY FOR USE AT ONCE



MECHANICAL FLOOR SCRUBBING

The problem of keeping large industrial floor areas clean is now solved. A rapidly increasing number of firms using our scrubbing (or polishing), rinsing and suction drying equipment are reaping the benefit by saving labour and wages and keeping floors spotless through regular daily maintenance. Floor scrubbing with Cimex-Fraser Tuson machines is not hard work and with the Vulture (model illustrated) as much as 3,000 sq. ft. (say 300 sq. metres) can be scrubbed, or, by a quick change of brushes, polished in the hour.

The Dipper Suction Drier shown also is used simultaneously to remove all dirty water—leaving floors completely dry and ready for immediate use.

For complete information about these time, money and labour saving machines write to

Cimex-Fraser Tuson Ltd.

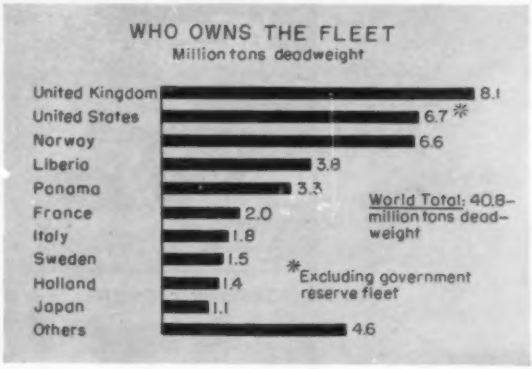
CRAY AVENUE, ORPINGTON, KENT, ENGLAND

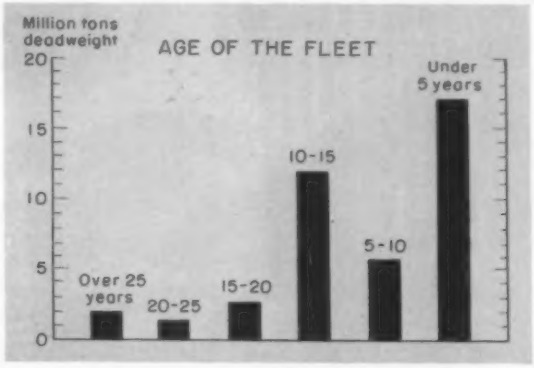
New

Automation appears to be the key to solving the parking problem in large, congested, metropolitan areas. A practically automatic garage has been designed.

An electronic "memory" system is the brains of the Gyro garage and the entire parking operation. Each parking floor consists of three rotatable concentric rings. Attendant drives car to elevator, pushes button for appropriate stall. Elevator rises to proper level. Meanwhile rings have been positioned for a clear path to the designated stall. Attendant parks car and returns. Total time is less than 1 minute.

Digested from ARCHITECTURAL RECORD, Oct, p247





World Tanker Shortage Looms

Digested from THE ECONOMIST (London), Oct 1, p5?

During the past few months, the world's shipbuilders—especially the British—have been getting big orders for oil tankers. These are new contracts—not part of the tanker-building program that started in 1950 and died out by the middle of '55. Since last July, 2½-million tons of new oil carriers (deadweight) have been ordered.

The big oil companies, having taken inventory of tanker fleets, have decided on expansion. Shell, for example, has announced contracts for 34 large tankers. Esso will add six 36,000-ton ships to its fleet. British Petroleum will announce new orders soon. Other oil groups will be ordering several "super-tankers" in the next few months. Deliveries: 1958-60.

A shortage threatens, despite all this activity. Today the world fleet of commercial tankers totals about 41-million tons (deadweight). That is 75% more than at the end of 1945. But, during the past 10 years, oil consumption in the free world went up about 100%. It will continue to go up—faster than ever.

The oil industry, whose production, refining and transport facilities take a long time to build, is forever thinking and planning far ahead. Shell Oil estimates that demand for petroleum products in the free world (outside the U.S.) may double once again or even treble in the next 10 years. That would mean an annual increase in demand varying between 6.5 and 10.6%.

For the 5-year period to 1960, the Shell forecast is more exact. The average increase in petroleum demand in the free world (outside the U.S.) will be 7.6% a year, according to Shell. This means that world tanker tonnage, to stay at a healthy level, should increase about 5% a year—all factors considered.

A world fleet of 52-million tons will be needed by 1960 if Shell figures are correct. Considering the number of ships in the present fleet that will be scrapped (after 25 years in service) and the number now on order for delivery in 1958-60, the fleet will be from 2-million to 4-million tons short at the end of 5 years.

New tonnage — beyond present building programs—will be put on order. That is a fair assumption, though just how much and how soon is a question. Moreover, it seems likely that the oil companies centered on the European side of the Atlantic will need most of the new ships. This means that British shipyards will get a large part of any new business in the next few years.

But new tanker orders, if they are to avoid a shortage by 1960, will have to be placed without delay. The oil companies are trying to insure this by encouraging independent shipowners to enter the tanker trade—to share both the financial investment and the reward.

The middle sixties will see even a greater threat of shortage. Tanker owners will then be entering a period when the rate of necessary replacements will be high. The large number of tankers built during World War II will begin to hit the 25-year mark.

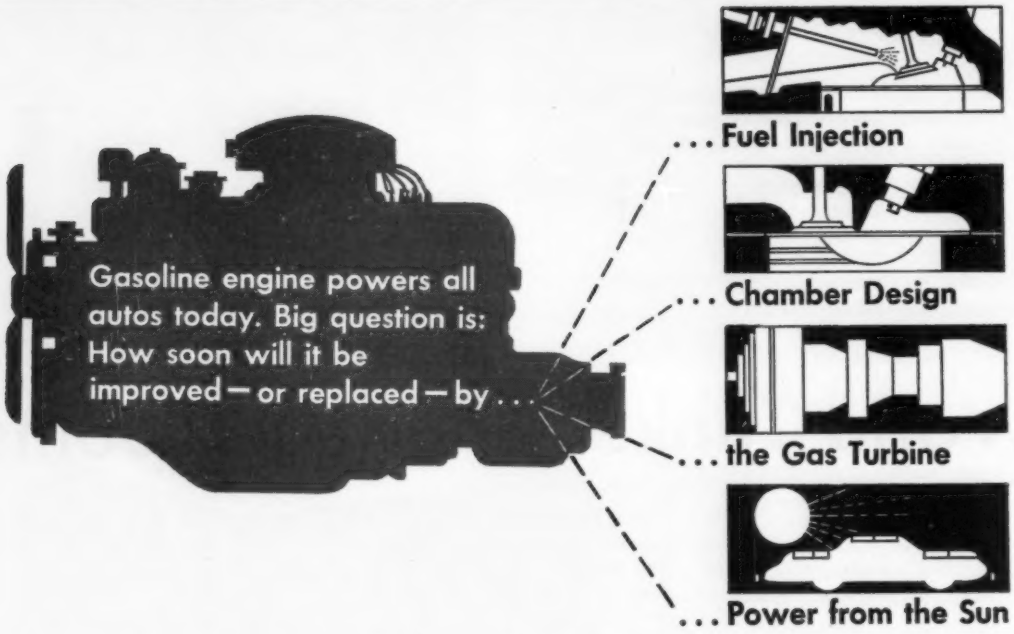
Atomic energy will have little effect on the petroleum trade in the fifties and sixties, according to oil-company forecasts.

▶ New

Marine gas turbines have reached a point in development where they can compete with either the steam turbine or diesel. Parsons and Marine Eng'rg Turbine Research and Development Association (England) has poured 10 years of study into the development of a competitive marine gas turbine.

Typical installation would have two 5,000-shaft-horsepower turbines driving a single screw. First cost would be 6% greater than that of a comparable steam turbine. Weight would be about half that of a steam turbine and a quarter of that of a diesel engine. Few auxiliaries would be needed and maintenance should be lower. Ordinary boiler oil could be burned as fuel, with a fuel additive to minimize turbine blade fouling. This has been the greatest deterrent to a successful design.

Digested from BRITISH MOTOR SHIP, Nov, p349, 352


Gasoline engine powers all autos today. Big question is: How soon will it be improved — or replaced — by . . .
. . . Fuel Injection
. . . Chamber Design
. . . the Gas Turbine
. . . Power from the Sun

Your Auto Is Due for Some Changes

Digested from PETROLEUM WEEK, Oct 14, p11; Oct 21, p22

Exciting, perhaps revolutionary, changes in automobile engines are coming within the next 10 years. Today's gasoline piston engine is a highly efficient power plant. But its efficiency, despite possible improvements in engine design and fuels (MD, Nov, '55), may not be great enough to keep its unchallenged position in the industry.

New developments are on their way to the production line. Here's what you can expect in the next decade:

• **Fuel injection** will make its appearance on a small scale in some 1957 automobiles. It will replace the carburetor, increase horsepower, boost economy.

At first, fuel will probably be injected into the intake manifold, rather than directly into the cylinder. Direct injection would involve redesign of the engine head, a costly factor. Of the two types of fuel injection—metered and continuous flow—metered injection is favored but continuous flow is cheaper.

Tests have shown that a car equipped with fuel injection can deliver from 6 to 7% more power. This may possibly be raised up to 25% if the engine is specifically designed for fuel injection.

• **Combustion-chamber designs** underway will raise the efficiency of present piston engines. Some designs involve minor changes in the shape of the chamber in the cylinder head. Others move the chamber into the piston, with little or nothing in the head.

Designers have been spurred to new studies by the new Maschinenfabrik Augsburg Nurnberg (Germany) diesel engine with fuel injection into a chamber wholly machined out of the top of the piston. They feel that research into combustion-chamber design may develop an engine that will operate on 70- to 80-octane gasoline.

• **Gas turbines** are expected to appear in passenger cars by 1960 and to be in quantity use by 1965.

Their use will (1) simplify petroleum refining as high octanes will no longer be needed, (2) eliminate additives, (3) reduce lubricating-oil requirements.

They also will probably eliminate air cleaners and oil filters on the cars, as well as antifreeze, thermostats, fan belts, water pumps. A possibility is a combination gas turbine-piston engine.

• **Solar power** may someday be harnessed to operate an automobile efficiently.

General Motors has made a midget car powered by 12 photoelectric cells on its top. They convert light into electric power, which operates a tiny motor that propels the car. But translating such a design into large size is not practical at present.

• **Other possibilities** include two-cycle engines and atomic power. Two-cycle engines, now increasing in use in small European cars, can raise power by about 40% over present four-cycle engines with the same number of cylinders. But they operate roughly and demand constant and expert care. Atomic-powered engines, according to automotive engineers, will not soon—and may never be—used in your family automobile.

Mr. Transport Chief—

HERE'S A SOUND BUSINESS INVESTMENT!

SPECIFICALLY DESIGNED to increase profits on 1½ to 3 ton haulage operation, the remarkable THAMES truck with 4-cylinder O.H.V. 'Cost-Cutter' Petrol engine is the efficient, economical answer to your needs:

Check these features against **your** *needs:*

- ✓ **STRONG, RUGGED CHASSIS—DESIGNED FOR MAXIMUM STABILITY**
- ✓ **GIRLING, HYDRAULIC, TWO LEADING-SHOE BRAKES**
- ✓ **HEAVY-DUTY GEAR BOX AND CLUTCH**
- ✓ **SEMI-FORWARD CONTROL**
- ✓ **12-VOLT ELECTRICAL SYSTEM**
- ✓ **GREATEST VALUE AT MINIMUM COST**

See your Ford Dealer for full details.

ASK YOUR DEALER about the full range of famous Thames Commercial Vehicles. The 1½ ton and 2 and 3 ton models fitted with the outstanding **DAGENHAM-BUILT DIESEL ENGINE** or the 'Cost-Cutter' Petrol Engine . . . and the 4 and 5 ton models with choice of the powerful, economical 85 b.h.p. V.8 engine, or the famous P.6 Diesel.

4-CYLINDER 'COST-CUTTER'

THAMES

1½ to 3 TON MODELS

PRODUCTS OF FORD MOTOR COMPANY LTD · ENGLAND

SOLAR BATTERY gets final tests

Sun Furnishes Power for Telephone System

Digested from ELECTRONICS, Nov, p20, p178

Sunlight furnishes power to a rural telephone system near Americus, Georgia, as part of experiments conducted by Bell Laboratories. The solar battery on trial is encased in an aluminum housing less than a yard square. It contains 432 silicon cells.

The silicon cells are wafer-thin disks about 1 inch in diameter. Excess current from the solar unit, not needed for immediate telephone use, feeds into a storage battery that powers the phones at night or in bad weather. Transistors allow a much smaller power drain than vacuum tubes. As much as 11% of the energy received by the cells is converted. The best gasoline or steam engines can claim little better performance.

Impurities added to thin slices of high-purity silicon at high temperatures produces the cells. This is done at a precise rate to reach a depth of less than 0.0001 inch.

The new rural system allows several conversations to be sent simultaneously over a single pair of wires. Each conversation is sent at a different frequency, as has been done in the past on long-distance calls. But, at Americus, the system operates economically over short distances.

Transistor circuits help achieve economy. With current drain reduced as compared with electron-tube equipment, it is possible to power remote amplifiers with the solar battery.

▶ YOU AND YOUR PERSONAL AFFAIRS

Everyone should know how to write a good letter. It can help cement friendships, get the job you want, or make that important sale. While writing is creative and not simply a matter of "following directions," a few basic ideas can improve the effect of your letters.

First, get right to the point. The first five lines in a business letter to a busy executive often dictate whether it is read or not read. In these first few lines, you "meet" the person you are writing to and must create the feeling that you are writing about a matter of importance to the reader.

Say what you mean. Make sure that your letter cannot be misunderstood, even if it is read carelessly. And say it simply. Use short words and sentences. Long sentences, over 20 words, generally make reading difficult. So do unnecessary words.

Try to develop a lively, original style. Avoid the stilted phrases that stud so many business letters. How? By pretending you are talking to a friend. A friendly tone in a business letter pleases the reader.

✦ ✦ ✦

The long struggle against the common cold has reached a major milestone. The U. S. Public Health Service has announced a vaccine that provides protection against many cold-like infections caused by viruses known as APC.

While the vaccine is not effective against the mild cold, it combats type 3 virus. That is the biggest troublemaker. It causes epidemics of a 5-day illness with fever, sore throat, and inflammation of the eyes.

Another recent medical advance is a new blood test for diagnosing rheumatoid arthritis, the No. 1 crippler in the U. S. The test, using sheep's blood, is simple, highly accurate, and important in that 70% of all cases can be controlled if early treatment is given.

Still another advance important to you: Someday man may be able to immunize himself against polio, tuberculosis and other infectious diseases by simply drinking a quart of milk a day. University of Minnesota researchers have found that vaccinating a cow with dead disease bacteria builds up disease-fighting cells in the milk. The milk then immunizes the drinker.

✦ ✦ ✦

Household hint: Proper care will keep kitchen knives good for years. Commercial sharpeners, electric or hand, will keep a satisfactory edge on regular knives. But it's safer to have hollow-ground blades ground by a professional.

The hollow-ground blade is finer and more delicate than other designs; always use a cutting board with it and apply less pressure than with other knives. And keep the knives out of the dishwater to avoid warping of wood handles.

YOU has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

Color Will Help You Sell

- **American manufacturers are putting a rainbow of color into consumer products these days**
- **The trend has hit the U. S. home from kitchen to garage . . . with pastel pinks, greens, yellows**
- **Exporters' note: paint people say the craze for color will extend well into '57**

Digested from ELECTRICAL MERCHANDISING, Nov, p5, p145; CHEMICAL WEEK, Oct 29, p63; BUSINESS WEEK, Oct 15, p84

Indoors and out, the U. S. is becoming more and more colorful. Bear that in mind when you plan to market your wares there. If you paint your product, why retain an old-line standard color? A bright or unusual shade may put your product in many more U. S. shops—and at no extra cost.

Inside the U. S. home, major appliances no longer are always white. Colored refrigerators, stoves, cabinets—and even laundry equipment—are fast coming into style. Here is what some of the big manufacturers report after about a year's trial:

General Electric says that 17% of its total appliance output is now in colors other than white. The favorites are (1) yellow, (2) green, and (3) pink. These three account for nearly 90% of all color sales. Pink is strongly favored in the southeast. In California, "woodtone brown" is attracting many sales (probably because of the ranch-style, wood-finished homes there).

Kelvinator claims demand for colored ranges and refrigerators is so great that some 1955 orders will have to be carried over into the 1956-model year. Pink ranks first in appeal, followed by yellow and green. And Kelvinator, foreseeing excellent prospects for color in laundry equipment, is offering a new deluxe washer and dryer in three tones.

"The sale," Frigidaire says, "of colored appliances has shown an increase over last year and is gaining in importance." The company finds that yellow has a slight edge over green.

Geneva Kitchens' 1955 sales of cabinets were one-third in color. Pink ranked first. Then came sandalwood and yellow.

Youngstown Kitchens is marketing over 25% of its line in color. Yellow was ahead by a large margin over copper and blue. Youngstown feels that "color finishes . . . can influence markets and add substantially to volume."

So *Electrical Merchandising* is now advising the trade that "colored appliances will be an increasingly important factor in your future business. . . . The brighter pastels—pink, yellow, green—are favored. . . . If you are looking for a starting point in color, you might try laundry equipment. The customer may be more willing to experiment with color in the usually drab basement or utility room than in the more carefully planned kitchens."

As for the outside of U. S. homes, Sherwin-Williams Co. (Cleveland) has just completed a survey on regional color preferences. Surprising finding: there is little difference from one section to the next (California and Florida, generally considered as the most colorful, only seem that way because of colorful awnings, blooming flowers, and bright automobiles in the driveways).

One trend spotted was toward the use of bright contrasting colors for doors and door frames. This is most noticeable in row houses—where the attempt is to get a different color for each door.

Sherwin-Williams expects the current craze for color to extend well into 1957. Color television, just making its first vivid appearance in the U. S., gives the advertiser new visual opportunities and should make the consumer evermore color-conscious.

Another contribution to a more colorful outdoors may come from Aluminum Co. of America, which says that "it is now technically possible to hit any color of the rainbow" in aluminum. The finishes are actually part of the metal itself and can be produced in all basic colors or shades of color.

Alcoa sees wide uses for its discovery—from lawn furniture to building panels, from automotive trim to train and bus exteriors.

U. S. automobiles meanwhile will continue to be a riot of color this year. The new Chevrolet, for example, comes in 14 two-tone combination and 10 solid colors.

In packaging, some concerns have been changing colors from time to time, to give their products new up-to-date eye appeal.

▶ New

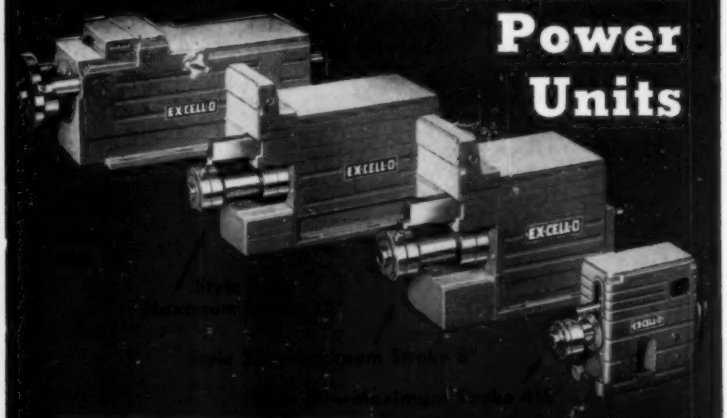
Food vending machines are getting into the hot-food business. Latest development is a machine that dispenses preheated meals in cans. Factories, hospitals, schools, and gasoline stations have shown interest. The H. J. Heinz Co. will market the machine. The menu: hot soups and stews.

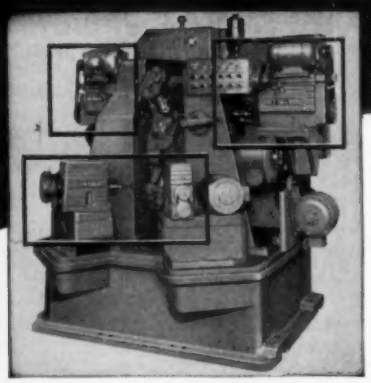
Selling food from vending machines is big business. In 1954, sales of sandwiches and drinks by this method reached $1.5-billion in the U. S. The total for '55 is about $2-billion. The total for '56 will hit an even higher mark.

Two "revolutionary" home appliances will be introduced by General Electric Corp. in a month or two. One is an electric clock without a plug-in cord. It uses an electronic circuit with transistors, eliminating the need for plug-in wire connections. The other is a high-frequency electric cooking oven. The oven will be wall-mounted and will use high frequencies to cook foods in just a few minutes.

Digested from AMERICAN LETTER, Oct 29

Ex-Cell-O Quill-Type Hydraulic Power Units





This special machine with automatic indexing fixture core-drills piston pin holes and drills angular oil holes. It uses six Ex-Cell-O Power Units (shown without belt guards) operated from a central push-button station.

Ex-Cell-O Power Units feed and rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spot-facing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions. For details about these units write, or cable Ex-Cell-O in Detroit.

EX-CELL-O CORPORATION

Detroit 32, Michigan, U.S.A.

CABLE ADDRESS: XLO, DETROIT, U.S.A.
PRECISION MACHINE TOOLS • CUTTING TOOLS • MACHINES TO PACKAGE MILK IN SANITARY PAPER CONTAINERS.

XLO
EX-CELL-O for PRECISION

55-25

Make Your Package Easy to Read

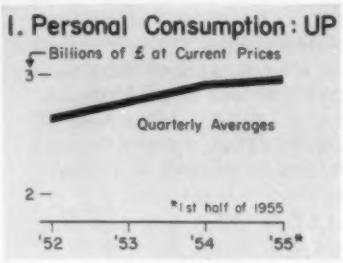
Digested from PRINTERS' INK, Nov 4, p32

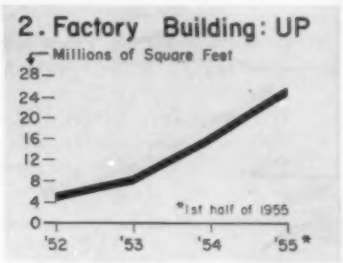
The emphasis on self-service and self-selection in retail stores makes the quick readability of packages and labels more important than ever before. Package designers must think in terms of fast "flash" appeal to catch the customer's eye. Not just the product name, but also sales points and how-to-use information must be clear and easily understood at a glance.

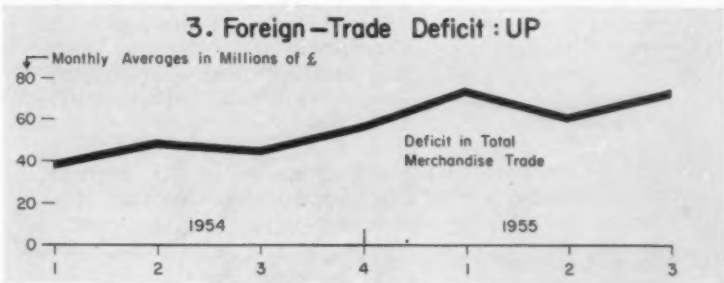
Remember their eyes. That is the "underlying guide" to designing easy-to-read packages, according to one expert. Remember that many people cannot, or simply will not, bother to read small print or even medium-sized print. Details are not eye-catching—at least, not in the world of advertising and sales promotion.

Use of color adds to eye-appeal and helps produce a package that the casual customer will pause to examine. Color must be related to four things: (1) the type of product and the colors of competing products; (2) the appearance of the package as a whole and its color-relation to other packages produced by the same company; (3) the position (or desired position) on the display shelf; (4) the type or class of buyers. It is a question of balance, good taste, and knowing exactly how, where, and to whom the product is sold.

Eight rules of readability are listed by another expert package designer: (1) Always strive to use large type—at least several sizes larger than newspaper type. (2) Use simple language. Four- or five-letter words are best. Keep the printed material short. (3) Use quick "easy-to-do" headlines like "Simply do this," or "All you do is . . ." (4) Use 1-2-3 numerals to give consecutive steps and directions. (5) Use pictures in place of words wherever you can. They say more. (6) Be specific. Mention exact measurements, cooking time, cost per square foot, etc. (7) Do not use complex package designs. (8) Use conventional type styles, not obscure, fancy type, or type that requires more than a glance.







The Charts Above Show Why . . .

Britain Fights Its Boom

Digested from BUSINESS WEEK, Nov 5, p52

The business boom in Britain has become a subject to worry about. At least, it is worrying R. A. Butler, Chancellor of the Exchequer. He is now in the middle of some fairly drastic measures that are designed to keep the inflationary economy under control. These control measures, unfortunately, could easily produce a most unwanted result in the country's economic structure.

For the past 2 years, British consumers have been spending freely, especially for durable goods (see chart 1 above). At the same time, British manufacturers have been stepping up their investment in new plant and equipment at a fast rate (see chart 2). The combination has pushed imports up and up and has dangerously widened Britain's trade gap (see chart 3).

As a result, both consumption and investment have been vigorously attacked by Mr. Butler. His attack, started almost a year ago, is still going strong.

Last February, Butler started his deflationary program by raising the bank rate to 4½%, the highest in 23 years. Consumer-credit restrictions, dropped the previous summer, were reimposed. Commercial credit was tightened further in July and, more importantly, banks were officially asked to exercise restraint in making loans for both investment and consumption.

By late last summer, Butler could see his "medicine" was starting to slow down the boom. The export-import gap began to narrow a bit. Sterling became firmer. But these results proved to be both moderate and temporary.

Excess demand was still present. Buying continued. Factory construction continued at a fast pace. Finally, a month or two ago, Butler saw (1) a continued rise in personal income that would push costs and prices up; (2) a threat to Britain's competitive position in world markets and further trouble with the balance of payments. The gap was again widening.

So a few weeks ago, Butler presented to Parliament a tough monetary program that included both higher taxes and lower government spending. The tax on distributed profits was raised from 22½ to 27½%. Existing sales taxes were raised 20% and extended in coverage. Under the new rates, consumer "durables" such as household appliances and television sets are taxed 60% at retail.

With his government spending cuts, Butler started some "basic reforms." He announced a drastic cut in government housing subsidies, a provision for raising restricted prewar house rents, a sharp cut in capital spending by local governments, and a curb on the capital spending of the nationalized industries.

The danger is that Butler's deflationary program, as a whole, will tend to kill off the very industrial development that Britain needs so badly if it is to compete in world markets. Convertibility of sterling — a great sign of confidence and strength — seemed so close a year ago, but now is put off to the distant future.

The reforms of the past year, including the newest ones announced, "again as in the past, may have been too little and too late." In a year or two, Britain may be forced to devalue the pound in order to sell enough goods abroad to cover essential foreign payments.

Black Market Is Dying

Digested from AMERICAN LETTER, Oct 29

The volume of black-market currency transactions in the world's foreign-exchange centers is declining steadily. Activity in Tangiers, Beirut, and Hong Kong is down 50% in the last 5 years. The main reason: improved economic conditions in Western Europe.

Experts in New York think black-market currency will have vanished by 1960. Moreover, the present differences in quotations on "approved" free-market transactions will almost disappear, they say, providing no serious economic upsets occur meanwhile.

Chances are exchange traders in New York and Zurich, where pound sterling "quotations" are determined, will react favorably to Britain's recent announcement of still further steps to curtail inflation.

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FINANCIAL DIGEST

Ford Motor Co. stock will be sold overseas. Investors outside the U. S. will soon have a chance, as will American investors, to buy stock in the world's second largest automobile company. Seven million shares, at something close to $60 each, will be offered to the public. Thus, a world-famous tradition of family ownership comes to an end.

Seven Wall Street investment firms will handle the deal. Two of them—White, Weld & Co. and Kuhn, Loeb & Co.—have especially good facilities for overseas distribution. White, Weld recently became the first American investment banking firm to set up business in Zurich, Switzerland. The firm will operate a subsidiary there and expects to handle a wide range of European business from that financial vantage point. The Ford business will be an important item on its list.

The Ford Foundation, now in control of the company, wants and expects to satisfy a large overseas demand. Make contact through your local broker.

✦ ✦ ✦

Foreign bidders on U. S. contracts have won an advantage. The "Buy American" regulation, covering U. S. government purchases, has been modified by the Interior Department in Washington. Under the old rule, a foreign bidder won the contract if his price was 6% under the lowest U. S. bid. But he lost the contract, regardless of his low bid, if a competing U. S. bidder was located in a "labor-surplus area."

Now the foreign bidder wins, even against a U. S. bid from a labor-surplus area, if his bid is low by 12%. The 6% rule still applies to bids from other areas.

✦ ✦ ✦

The managers of a business can "make it or break it." Whether a company moves ahead, stands still, or falls back, depends largely on the abilities and imagination of its top executives. For the investor, knowledge of these abilities is vital. It is also a problem. The investor is often at a distinct disadvantage in this area.

The American Institute of Management has a test that it has applied to the managements of 56 large U. S. corporations. Company ratings, based on a point system, have been published for the benefit of prospective investors.

The minimum required for a rating of "excellent" is 7,500 points—using the following sytem: (1) For economic function, as part of the industry, from 300 to 400 points. (2) For effective corporate organization and internal communication, 375-500. (3) For company growth through a full business cycle, 450-600. (4) For service to stockholders, 525-700. (5) For research and development, 525-700. (6) For quality and vigor of directors, 675-900. (7) For fiscal policies, 825-1,100. (8) For production efficiency, 975-1,300. (9) For salesmanship, 1,050-1,400. (10) For executive "team spirit," 1,800-2,400.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.

New Books

"Getting the Most from Research and Engineering" is one in the new Manufacturing Series of booklets published by the American Management Association. The organization and administration of research and engineering functions of a business are outlined. Price—$1.75.

"Guides to Effective Production Management" is another in the valuable AMA booklet series. It covers communication, coordination, and controls between top management and the production department. Price—$1.75. Write to American Management Association, 1515 Broadway, New York 36, N. Y.

•

The New American Machinist's Handbook—Edited by Rupert Le Grand, the book is completely new and truly up to date. It has been written to make all the material timely and to arrange it in logical order for use by apprentice, machinist, engineer, and executive.

Subject matter is divided into 45 sections grouped into 11 parts—machining methods, metal-forming methods, assembly methods, materials, finishing of metals, inspection, fastening devices, tool engineering and drafting practice, machine-tool standards, power-transmission equipment, and mathematics and tables.

The handbook is published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 1591 pages. Price—$9.00.

•

Motion and Time Study—Written by Gerald Nadler, the book provides an operating procedure for solving motion and time-study problems. New and old techniques and adaptations of old techniques are described in detail.

The problems that confront motion- and time-study practitioners are presented; their effect on concept and practice is fully discussed. Solutions are given where possible.

Book is published by McGraw-Hill Book Co., Inc., 330 W. 42nd. St., New York 36, N. Y. 612 pages. Price—$7.50.

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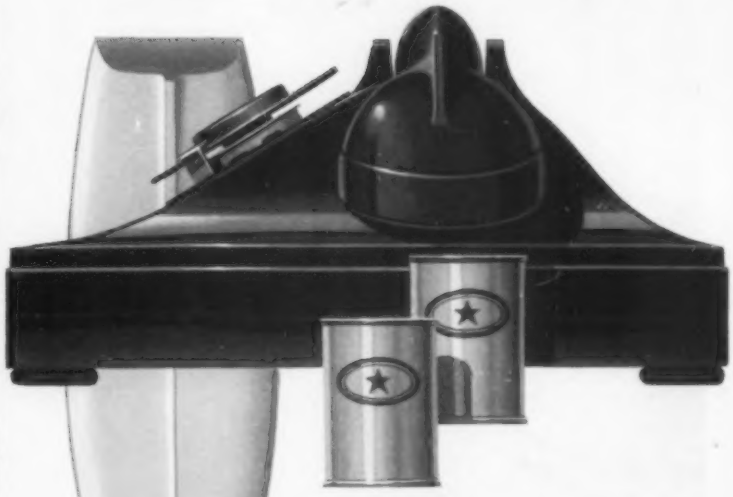

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▶ NEW PRODUCTS

New Air Conditioner for Large Areas Is Designed for Low Installation Costs

The new self-contained Weathermaker air conditioner is designed for low-cost central-duct-system air conditioning of stores, suites, offices, and other large areas.

Developed to meet recent trends in packaged installations, the unit eliminates all the dealer "tailoring" formerly required on jobs using duct work. Installation savings are effected with or without ductwork, regardless of whether the unit is built into a wall, installed outside the space, or set completely in a room.

Air can enter the Weathermaker in any of five ways—front, rear, both sides, and also through the bottom of the unit. A base accessory reduces the amount of return-air ductwork and installation space required. This feature permits more freedom in locating the unit.

The Weathermaker employs water-cooled refrigeration. It is manufactured in sizes of 2, 3 and 5 horsepower. The condenser stands in an upright position so that less liquid refrigerant collects in the bottom. This insures better heat transfer and reduces water consumption.

The fan moves large volumes of air slowly and quietly. It may be changed easily from top to rear discharge for installations with low headroom. **(Carrier Corp., Syracuse 1, N. Y.)**

●

Sliding-Head Floor Drills

Every important element of new 21-inch sliding-head floor drills is built-in and conveniently located for operator comfort and pleasing appearance. The drills are shipped complete with motor and controls.

Geared power feed is standard equipment. A simple selector is used to obtain any of four rates of feed, which are engaged through a positive-jaw clutch. The spindle is mounted in tapered roller and ball bearings that take radial and thrust loads. **(Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio).**

Smaller Lift Truck

A compact, easily maneuverable 5,000-pound lift truck has a turning radius of 79 inches. Its short length, narrow width, and ease of steering contribute to faster use.

The HC-50's net weight, 7110 pounds, permits truck operation on lighter-weight floors. Low center of gravity and comparatively long wheelbase are design qualities that improve traction, weight distribution, and operating ease.

The lift truck is powered by a Waukesha gasoline engine. A diesel engine, liquefied-petroleum-gas conversion kit, Hystamatic Drive, and Hyster Free Lift are optional features. **(Hyster Co., 1829 N. Adams St., Peoria 1, Ill.)**

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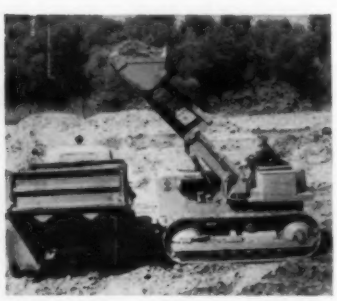

Diesel-Powered Tractors

Two new units, the HD-6 crawler tractor and the HD-6G tractor shovel, are powered by a four-cylinder, four-cycle Diesel engine.

The HD-6 crawler tractor has a maximum drawbar pull of 12,650 pounds. It has five forward speeds ranging from 1.5 miles per hour in first to 5.5 in fifth gear, and 2 miles per hour in reverse.

The HD-6G tractor-shovel has four forward speeds, which also range from 1.5 to 5.5, and two reverse speeds at 2 to 4.1 miles per hour. It offers as standard equipment a 1½-cubic yard, two-position bucket. Special interchangeable equipment for the HD-6G includes rock, drag and light-materials bucket; an angledozer and two bulldozer blades; crane hook; trench hoe; lift, tine, and rock forks. **(Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.)**

Portable Earth Borer

A newly engineered vibratory earth borer has been designed to solve the costly problems confronted in laying pipe and conduit under sidewalks, driveways, and runways. Without removing any soil, the earth borer quickly makes a 2-inch-diameter hole straight through the soil, under concrete sidewalks, and even under wide driveways.

Powered by a gasoline engine, the borer head stays on a steady level course all the way. Portability of the earth borer is provided by its rubber tire wheels. **(Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill.)**

●

Special Purpose Grinder

Type CMS-1 semiautomatic multi-wheelslide cylindrical grinding machine can be adapted to a wide range of cylindrical grinding operations. The principal advantage of the machine is its ability to plunge-grind multiple diameters simultaneously on workpieces that, because of their shape, do not lend themselves to grinding on conventional multi-wheel machines.

The grinder has unitized wheelslides that are positioned for the requirements of a specific job. The wheelslides may be opposed or placed in line, whichever is better suited.

Each wheelslide mounts one or more 30-inch diameter grinding wheels as the nature of the job requires. Chucking arrangements on a single work head or equipment for holding the work on centers can be supplied. **(Norton-Behr-Manning Overseas, Inc., Worcester 6, Mass.)**

10,000-Pound Straddle Carrier

Series 71 straddle carrier features synchromesh transmission, full hydraulic control of load hooks, and Radiarc steering. The machine has a rated capacity of 10,000 pounds. Nine models capable of carrying loads ranging from 42 to 54 inches in height and 40 to 52 inches in width are available. The carrier is equipped with either a Ford 130-horsepower engine or a Hercules 91-horsepower engine, both powered by gasoline or liquefied petroleum gas. (Clark Equipment Co., Benton Harbor, Mich.)

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THE DAILY MAIL Ideal Home Exhibition is Britain's greatest "shop-window" of goods for the home. Last year it attracted a million and a quarter visitors. Every aspect of home life is represented — architecture and building ; decorating and furnishing; heating and lighting; the kitchen and nursery ; domestic labour-saving; leisure and fashion. The goods on view are the very latest of their kind, and three-quarters of the exhibitors are interested in overseas markets.

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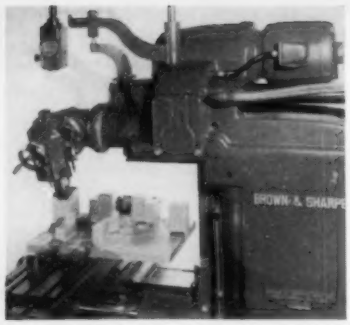

Milling Machines Offer Wide Spindle-Speed Range

The wide work range and versatility of the Rangemaster No. 20 universal and No. 20 plain milling machines—sliding-head type—will be of value in many fields. The ability to change quickly from horizontal to vertical and angular milling will appeal to mold and die workers. Manufacturers of prototypes, where the part must be securely clamped and then machined on many surfaces in many different planes without disturbing the work piece, will welcome the machine.

Eighteen spindle speeds are available for each spindle, from 40 to 1,530 revolutions per minute for the main spindle and from 80 to 3,060 revolutions per minute for the spindle of the universal head. **(Brown & Sharpe Mfg. Co., Providence 1, R. I.)**

•

Portable Rotary Compressor

The Blue Brute 600 portable rotary compressor has been placed on the construction-equipment market. A new easy-acting clutch allows operators to warm-up the engine before cutting in the compressor. This feature results in less wear, quicker starts in cold weather, and simplified engine maintenance.

The fully self-draining compressor eliminates settling of oil and moisture in any low areas of either cylinders, interstage chamber or discharge point. The Blue Brute's cylinder arrangement gravity-drains all oil and moisture during shutdowns. This assures protection of blades on cold starts. **(Worthington Corp., Harrison, N. J.)**

NEW PRODUCT BRIEFS

For Faster Typing—Typing that requires the frequent return to either of two different left-hand margins is speeded with new electric typewriter with intermediate margin stop. Exact, even left-hand margins is speeded by a new elec- of a key that returns carriage to either the first margin or indented margin as required. **(Remington Rand, 315 Fourth Ave., New York 10, N. Y.)**

•

Speeds Printing Process—Jack Stacker inverts stacks of paper for rerun through a printing press. The load of paper rests on a skid and another skid is placed in an inverted position on top. When the load and the two skids are clamped by hydraulically operated clamping arms, they are then raised 1 foot and rotated 180 degrees, readying paper for its rerun through the press. **(Lewis-Shepard Products, Inc., Watertown 72, Mass.)**

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Nearly 200 "EUCS" already at work on the

Model 63TD "Euc" getting a heaped load of 20 cu. yds. at site of Long Sault Dam near Massena, N. Y.

Although work on the St. Lawrence Seaway and related New York Power Authority projects is just getting under way, close to 200 Euclids are already "digging in". They're helping build cofferdams, making diversion cuts, relocating highways and railroads, and preparing power house sites. Other "Eucs" are doing similar jobs on the Canadian side of the river.

One of the key projects in the whole Seaway program is construction of Long Sault Dam near Massena, N. Y., a joint venture sponsored by Walsh Construction Co. Others who have pooled their men and machines on this 7 million yard job are B. Perini & Sons Co., Morrison-Knudsen Co., Peter Kiewit Sons Co. and Utah Construction Co. . . . some of America's leading contractors. At present 50 "Eucs" are working on this one contract and others will be added as work progresses.

Eight of the Euclids are 22-ton Rear-Dumps with 300 h.p. engines and Torqmatic Drives. They were selected for this job because of their ability to haul big loads at fast travel speeds day in and day out . . . with less down time for servicing and repairs. That's the kind of performance that has made "Eucs" the preferred equipment for hauling heavy excavation on the toughest jobs everywhere . . . it's one of the important reasons why ***EUCLIDS are your best investment.***

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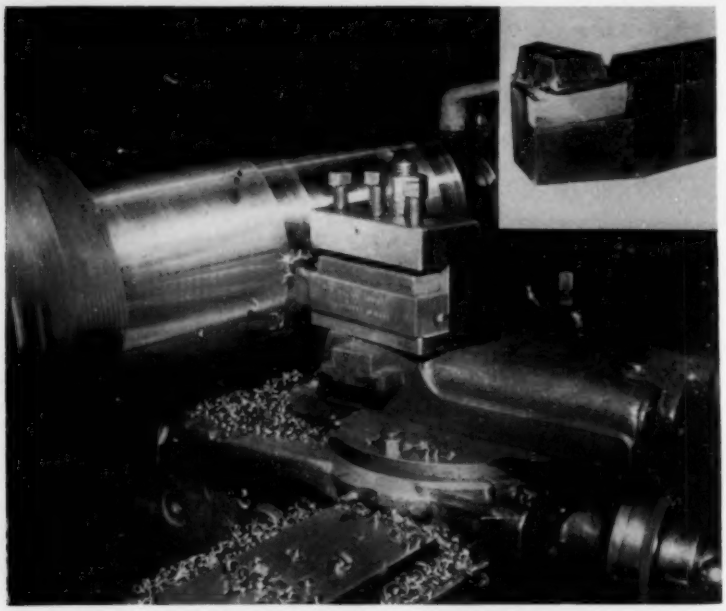

New Metal-Cutting Ceramic Tools Operate at High Machining Speeds

Ceramic tools cut up to three times faster than normal, require no coolant, and produce excellent surface finish. As more rugged machines with increased power become available, it is expected that even greater superiority will result.

One importance of this new tool to industry lies in the abundant supply of ceramic materials. In addition, they have the added advantage of being considerably less expensive than conventional tools.

Machining tests on steel (SAE 1020 and SAE 4140), commercial brass, and low-alloy cast iron show that the hardness, high-temperature strength, and wear-resistance properties of the ALUNDUM cutting tools are superior to metallic tool compositions.

Workpiece and cutting tool remain cool to touch when the tool is operated with proper tool geometry and chip-breaker adjustment.

Because of the remarkable heat resistance of the ALUNDUN ceramic tool, blanks may be shaped by dry grinding with diamond wheels. Resharpening is easily done on the same metal-bonded diamond wheel used for sharpening carbide tools.

These ceramic tools cut cleanly and show minimum scoring of the workpiece. Such characteristics are attributed to the absence of top-face cratering by chip friction of the ceramic tool because of the low affinity of aluminum oxide for metals. On cast iron containing sand holes, which normally cause machining troubles, the ALUNDUM ceramic tool cut through without chatter or tool fracture.

New ALUNDUM tool bits, made of aluminum oxide, are entirely in the development stage and are available only in limited quantities to industry for research and machining studies. **(Norton Behr-Manning Overseas Inc., Worcester 6, Mass.)**

●

Glassed-Steel Reactors

Major design improvements have been incorporated in the new "R" series of glassed-steel reactors. The drive support is mounted on a separable center cover, permitting removal of the drive and agitator assembly without disturbing nozzle connections. For operating flexibility, nine nozzles from 3 to 10 inches in diameter are provided.

At temperatures up to the boiling point, the glassed-steel construction is resistant to all acids, except hydrofluoric, and alkalis to pH 12. Most acid solutions at temperatures up to the vessel design can be processed. **(The Pfaudler Co., 1000 West Ave., Rochester, N. Y.)**

●

Light Truck Power Brake

A "light truck" power brake suitable for installation on any ½-, ¾-, and 1-ton model of GMC, Chevrolet, Dodge, Ford and International Harvester truck was recently announced. This new model "Hydrovac" is supplied in a single installation kit and is designed for installation in 45 minutes or less. **(Bendix International Corp., 205 East 42nd Street, New York, N. Y.)**

●

Chain Couplings

New couplings provide a strong and positive, yet compact, direct coupling between shafts. They are of a flexible type and permit sufficient relative movement between the hubs to accommodate slight shaft misalignment.

An outstanding feature of the couplings are Taper-Lock bushings. They allow easy installation upon full size or normally undersized shafts, yet give the equivalent of a shrunk-on fit. **(Dodge Mfg. Corp., Mishawaka, Ind.)**

NEW COMPONENT BRIEFS

Oil-resistant Belting—A conveyor belt, made with a nitrile-synthetic-rubber cover, has greater resistance to the penetration of vegetable and animal oils and fats. It is designed for use in food processing plants, feed and textile mills. **(Hewitt-Robins Inc., Stamford, Conn.)**

•

Calcium Silicates—Micro-Cell, a new line of synthetic calcium silicates, provides a combination of properties that may hold the key to lower costs and improved products in many process formulations. **(Johns Manville Intl. Corp., 22 E. 42nd St., New York 16, N. Y.)**

•

Chain Saw Improved—A new improved "double cutter" planer chain cuts with true, low-friction, "planing" action. This action eliminates the main cause of chain breakage in hard or frozen woods. **(Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill.)**

•

Valve Positioner—Type C Vernier Valvactor is a new and highly accurate valve positioner designed for precise control action. Its applications include large-volume diaphragm motors and processes where controller-to-valve distances are long. **(Foxboro Co., Foxboro, Mass.)**

•

Horizontal Motors—A new line of Uniclosed horizontal motors has face-type mounting brackets for direct connection to driven equipment. Motors are extremely compact and are available in ratings from 1 to 30 horsepower. **(U. S. Electrical Motors Inc., Box 2058, Los Angeles 54, Calif.)**

•

Current Transformer—a new 600-volt current transformer, type JCH-0, is suitable for operating ammeters and wattmeters in applications where revenue-metering accuracy is not required. **(International General Electric Co., 570 Lexington Ave., New York 22, N. Y.)**

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YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write directly to the addresses given.

Asbestos Textiles—Countless products are being made safer, better, and cheaper with asbestos textiles. Some of them: friction facings and linings, insulation, conveyor belts, diaphragms, protective clothing. "Asbestos Textiles" manual tells you how to use them. (Johns-Manville Intl. Corp., 22 E. 40th St., New York 16, N. Y.)

When You Measure Temperature—Accurate measurement depends on selection of the proper type of filled thermal system best suited to your needs. Catalog 12-A-10 shows indicating, transmitting, recording, and controlling instruments for temperature from −400° to +1000°F. It will help you select the right unit. (Fischer & Porter Co., Hatboro, Pa.)

Diesel Marine Engines—Lower operating costs, increased power, greater payload capacity, and longer service life are possible, according to bulletin 233, with Supairthermal engines. (Nordberg Mfg. Co., Milwaukee 1, Wis.)

Chemical Literature Available—"Your Handy Checklist of Helpful Diamond Literature" lists reference manuals, handbooks, technical bulletins, and product pamphlets for which you can write. (Diamond Alkali Co., 99 Park Ave., New York 16, N. Y.)

Choose Your Own Weather—You can do it with Unitrane, the modern air conditioner for multi-room buildings. Bulletin S420A-20-655 discusses how it works, its flexibility, installation, operating economy, and low maintenance. (Trane Co., La Crosse, Wis.)

Canadian Official Handbook—If you plan to visit Canada or invest or do business there, this new handbook will give a wealth of needed information. It portrays the present conditions of the Canadian economy and its people. Price is 75¢. (Dominion Bureau of Statistics, Ottawa, Canada.)

Materials-Handling Case Studies—Twenty-five case studies of handling by industrial truck cover a number of industries: motor freight, chemical warehousing, food processing, paper, bottling, furniture, paint, rubber. They are packed with ideas on cutting handling costs, speeding production. (Lewis-Shepard Products, Inc., Watertown, Mass.)

A Handy Port—Facilities at Newport News, Virginia, move cargo fast and safely. A new booklet tells you all about them—and the port too. (World Commerce Dept., Chesapeake & Ohio Railway, Newport News, Va.)

Products and Processes—Booklet reviews Union Carbide's vast operations and summarizes the products it makes for so many industries. (Union Carbide Intl. Corp., 30 E. 42nd St., New York 7, N. Y.)

Liquid Vinyl Plastic—Vinylon is not a plastic paint, but a true liquid vinyl plastic. Uses: waterproofing of masonry, leakproofing of metals, corrosion prevention, coating concrete floors subject to heavy traffic. (Surface Coating Engineers, Inc., 211 Woodward Ave., Kalamazoo, Mich.)

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Sincerely yours,

Charles S. Mill

Charles S. Mill
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American Letter
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Aviation Week
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Bus Transportation
Chemical Engineering
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Ingeniería Internacional Construccion
Ingeniería Internacional Industria
Metalworking Production (London)
National Petroleum News
Nucleonics
Petroleum Processing
Petroleum Week
Power
Product Engineering
Textile World
The American Automobile (Overseas Edition)
Today's Secretary

Advertising Publications, Inc.
200 E. Illinois St., Chicago 11, Ill.
Industrial Marketing

American Bankers Association
12 E. 36th St., New York 16, N. Y.
Banking

American Management Association
330 W. 42nd St., New York 36, N. Y.
Personnel

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio
Metal Progress

Bill Brothers Publishing Corp.
386 Fourth Ave., New York 16, N. Y.
Sales Management

Breskin Publications
575 Madison Ave., New York 22, N. Y.
Modern Packaging, Modern Plastics

Dartnell Publications, Inc.
4660 Ravenswood Ave., Chicago 40, Ill.
American Business

F. W. Dodge Corp.
191 W. 40th St., New York 18, N. Y.
Architectural Record

The Economist Newspaper, Ltd.,
22 Ryder St., London S.W. 1, England
The Economist (London)

Fritz Publications, Inc.
431 S. Dearborn St., Chicago 5, Ill.
The Paper Industry

Harvard University
Soldiers Field, Boston 63, Mass.
Harvard Business Review

Industrial Publications, Inc.
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Ceramic Industry

Keeney Publishing Co.
6 N. Michigan Ave., Chicago 2, Ill.
Heating, Piping & Air Conditioning

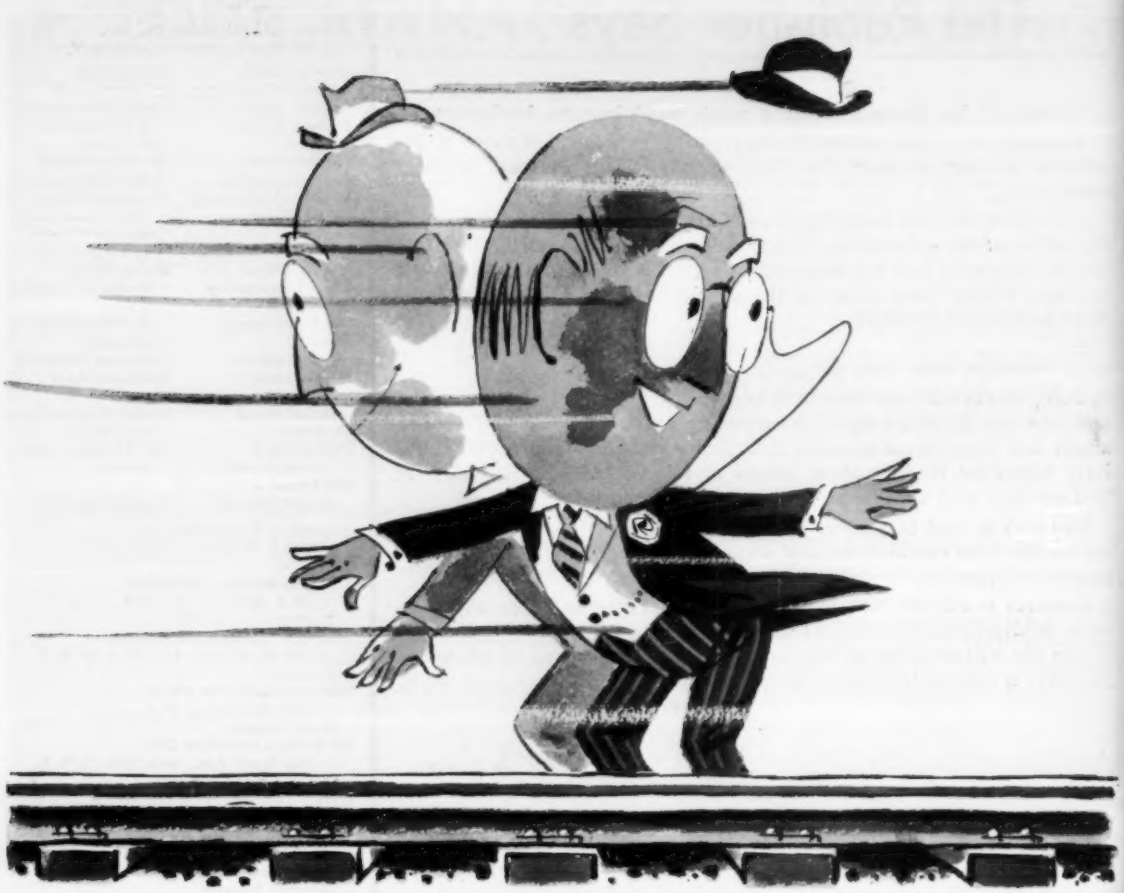
Petroleum Publishing Co.
211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Printers' Ink Publishing Co., Inc.
205 E. 42nd St., New York 17, N. Y.
Printers' Ink

Simmons-Boardman Publishing Corp.
30 Church St., New York 17, N. Y.
American Builder
Marine Engineering
Railway Age
Railway Track and Structures
Railway Locomotive and Cars
Railway Signaling & Communications

Temple Press Ltd.
Bowling Green Lane, (London E. C. 1, England)
The British Motor Ship

Welding Engineer Publications, Inc.
12 East Grand Ave., Chicago 11, Ill.
Welding Engineer



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